



# Entrepreneurial intentions and start-ups: Are women or men more likely to enact their intentions?

International Small Business Journal:  
Researching Entrepreneurship  
2018, Vol. 36(1) 60–80  
© The Author(s) 2017  
Reprints and permissions:  
[sagepub.co.uk/journalsPermissions.nav](http://sagepub.co.uk/journalsPermissions.nav)  
DOI: 10.1177/0266242617704277  
[journals.sagepub.com/home/isb](http://journals.sagepub.com/home/isb)



**Rachel S Shinnar**

Appalachian State University, USA

**Dan K Hsu**

Appalachian State University, USA

**Benjamin C Powell**

Appalachian State University, USA

**Haibo Zhou**

University of Twente, The Netherlands

## Abstract

While empirical data clearly show that women are underrepresented among entrepreneurs, the causes of this gap are entirely not clear. This article explores one potential cause: that women might be less likely to act on their entrepreneurial intentions. Building on Ajzen's theory of planned behaviour, we propose that intentions predict start-up behaviours, that is, that there is an intention–behaviour link. We then apply social role theory to propose that the intention–behaviour link is moderated by sex. Analysing data drawn from a sample of US-based management students during their first session in an introductory entrepreneurship course, at the end of the course, on their graduation and at a point up to three years after graduation, we find support for the intention–behaviour link and moderation of this link by sex. We identify additional contributions from our study and implications of our findings for addressing the sex gap in entrepreneurship.

## Keywords

entrepreneurial behaviour, entrepreneurial intentions, gender stereotype, sex

---

## Corresponding author:

Rachel S Shinnar, Walker College of Business, Appalachian State University, Boone, NC 28608-2037, USA.  
Email: [shinnarrs@appstate.edu](mailto:shinnarrs@appstate.edu)

## Introduction

Female entrepreneurship plays an important role in economic growth and poverty reduction (Allen et al., 2007; Kelley et al., 2015). Unfortunately, empirical evidence shows that women are less likely to become entrepreneurs (Bosma and Levie, 2009; Kelley et al., 2013; Shane, 2008). This can be partly attributed to the fact that entrepreneurship has been traditionally framed as a masculine career (Ahl, 2006; Henry et al., 2016) so that women in general have weaker intentions to become entrepreneurs (Shane, 2008). However, some women do have strong entrepreneurial intentions (EI), particularly in industries considered feminine (Gupta et al., 2009; Kelley et al., 2015). To what extent do these women, compared to men, act on their intentions? Understanding this question is essential as it could explain the low start-up rate among women, which could be caused not only by weaker EI but also by weaker propensities to act on those intentions. Indeed, Henry et al. (2016) point to the need for developing a deeper understanding of the 'complex nature of the female entrepreneurial endeavour' (p. 236).

To examine this question, we build on Ajzen's (1991) theory of planned behaviour (TPB), which has been frequently used to examine the formation of EI and behaviour (see Lortie and Castogiovanni, 2015, for a review). The theory posits that individuals are affected by exogenous factors such as their cognitive beliefs about attitude, control and norms to form EI. Subsequently, individuals are driven by these EI to actually start businesses (Ajzen, 1991; Kautonen et al., 2015; Rauch and Hulsink, 2015; Van Gelderen et al., 2015). Numerous studies on the TPB emphasize the cognitive antecedents of EI (Kautonen et al., 2015; Schlaegel and Koenig, 2012); however, studies on the relationship between EI and actual start-up behaviour remain scarce. While some empirical studies have shown a positive relationship between EI and actual behaviour in starting businesses (Goethner et al., 2012; Kautonen et al., 2013, 2015; Kolvereid and Isaksen, 2006; Rauch and Hulsink, 2015; Van Gelderen et al., 2015), research also acknowledges that individuals who do not have strong EI can still start businesses and become 'accidental entrepreneurs', a term coined by Fitzsimmons and Douglas (2011). Furthermore, not all individuals who originally intend to start businesses actually follow through on their intentions by taking steps towards start-up. Research by Kautonen et al. (2015) also argues that the time interval between intention and actual start-up matters. The question of how EI influence actual start-up, therefore, remains unclear prompting calls for further research (Kautonen et al., 2015). Accordingly, this article aims to contribute to the existing literature on the EI-behaviour link in the US context by exploring two issues in the relationship that remain under-explored: sex and the time interval between intention and start-up.

In examining the impact of sex on the EI-behaviour link, we are interested in how potential entrepreneurs believe that society reacts to them based on their gender identity rather than in the direct impact of gender itself. Sex and gender are different constructs (Ahl, 2006). Sex distinguishes between biological characteristics of men and women (biology, anatomy, hormones and physiology), whereas gender refers to the meaning society ascribes to male and female categories (constructed through social, cultural and psychological means). Gender is not simply one aspect of sex, but more fundamentally, it is something one does and does recurrently in interaction with others (Butler, 1990). Biological males generally have both masculine and feminine gender traits, and some may have higher feminine than masculine gender traits; an analogous assertion holds for biological females (Bem, 1974; Goktan and Gupta, 2015). What matters in the context we examine is neither the gender traits that individuals have nor their ascribed gender traits. We postulate that what affects individual propensity to act on entrepreneurial intention is the gender identity that they believe others attach to them and perceptions of the roles that others impose on them because of this gender identity. Individuals learn implicitly and explicitly which behaviours

are considered socially desirable for their gender identity; most internalize these norms such that those who feel perceived as primarily female may be discouraged from undertaking entrepreneurial activity. In this study, we use the traditional binary sex variable to measure the gender identity potential entrepreneurs believe society attaches to them. In so doing, we are neither asserting that gender identity is binary or static. We are asserting that there remains a strong social tendency to ascribe gender roles to individuals based on their perceived, dominant gender identity and that these roles have the potential to affect individual propensity to act on EI. It is testing the latter assertion that is the most important contribution of this article.

Drawing on social role theory (Eagly, 1987; Gupta et al., 2009), we make our primary contribution by investigating sex as a moderator in Ajzen's (1991) intention-behaviour link. Although female entrepreneurship is increasing, empirical evidence across different countries generally indicates a persistent sex imbalance when it comes to business ownership (Bosma and Levie, 2009; Koellinger et al., 2013; Santos et al., 2016; Westhead and Zolesvik, 2016). Addressing this imbalance requires an understanding of the underlying factors; thus, we contribute by exploring a potential cause derived from social role theory (Eagly et al., 2000). Socially prescribed gender roles lead to gender stereotyping of jobs as predominantly feminine or masculine (Eagly et al., 2000; Heilman, 1983). According to Heilman (1983), individuals aspire to jobs that are socially accepted for their sex while avoiding those considered appropriate for the opposite sex. Our research contributes to the literature on gender imbalance in entrepreneurship by examining whether women are less likely than men to act on EI – as social role theorist suggest. The secondary contribution lies in extending the limited literature on the EI-behaviour link (Kautonen et al., 2013, 2015; Kolvereid and Isaksen, 2006; Goethner et al., 2012; Rauch and Hulsink, 2015; Van Gelderen et al., 2015) by examining different time intervals between intention and behaviour in the US context. Kautonen et al. (2015) argue that the time interval between intention and actual start-up behaviour does indeed matter in the relationship. Using time intervals of different lengths, we contribute additional reliability and validity to the study of the EI-behaviour relationship, especially in the US context, in which the EI-behaviour link has not yet been investigated.

Following a group of management, undergraduate students enrolled in an introductory entrepreneurship course at a public university in the south-eastern United States through graduation and up to three years thereafter, we are able to measure EI at different points of time and examine their link to actual start-up. Our empirical results show that, regardless of the time intervals between individual EI and actual behaviours, intentions to start a business at an earlier point in time positively predict start-up behaviours at a later point. Furthermore, sex moderates the intention-behaviour link rooted in the TPB, with men being more likely to act on their intentions compared to women. Thus, sex plays a role in predicting the heterogeneity in actual start-up behaviour.

The primary purpose of this article is to investigate the sex difference in the EI-behaviour link using a longitudinal data set allowing for different time intervals between intentions and behaviour. To investigate these differences, we first need to establish the direct relationships between EI and behaviour. This direct relationship has already been investigated in prior studies to a limited extent (Kautonen et al., 2013, 2015; Kolvereid and Isaksen, 2006; Goethner et al., 2012; Rauch and Hulsink, 2015; Van Gelderen et al., 2015). However, these studies did not use multiple time intervals between EI and actual behaviour and did not explore the EI-behaviour link in a US context. To formulate our baseline hypothesis – the direct relationship between EI and behaviour – we first review the literature on the TPB, emphasizing the EI-behaviour link. Next, we develop our core hypothesis on the moderating role of sex in the EI-behaviour link, building our theoretical propositions on the foundation of social role theory (Eagly et al., 2000).

## *EI and behaviour link*

Ajzen's (1991) TPB has been frequently applied in the study of EI (Díaz-García and Jiménez-Moreno, 2010; Liñan, 2008; Liñan and Chen, 2009; Moriano et al., 2011) to explain the antecedents that shape individual intentions to pursue entrepreneurship. With some exceptions, researchers tend to agree that the three antecedents identified in the TPB – personal attraction, subjective norm and perceived behavioural control – do indeed shape individual EI. Personal attraction refers to the attitude a person holds about the behaviour in question. Subjective norm is defined as the 'likelihood that important referent individuals or groups approve or disapprove of performing a given behaviour' (Ajzen, 1991: 195). Finally, perceived behavioural control refers to the perceived ease or difficulty of performing the behaviour in question as well as anticipated impediments and obstacles (Ajzen, 1991). These three cognitive antecedents of the TPB are considered reliable predictors of EI, explaining one-third to nearly half of the variation in EI in various studies (Kolvereid, 1996; Liñan and Chen, 2009; Van Gelderen et al., 2008). However, EI and its antecedents are only important if they lead to meaningful outcomes, that is, start-up behaviours. This aspect of the theory remains under-investigated. Therefore, we focus on the degree to which EI predicts actual start-up behaviour.

The predictive validity of the TPB has been consistently demonstrated, but in the field of entrepreneurship, only a handful of studies has examined the intention–behaviour link (Goethner et al., 2012; Kautonen et al., 2013, 2015; Kolvereid and Isaksen, 2006; Rauch and Hulsink, 2015; Van Gelderen et al., 2015). While each of these studies has increased our understanding of the intention–behaviour relationship, some limitations remain. For example, Goethner et al. (2012) used a sample of German academic scientists. Whether their results would remain relevant in another population and national context is unknown. Also, some studies such as Kautonen et al.'s (2015) employed a relatively short time interval (one year) which may underestimate the intention–behaviour relationship as starting a venture can be a lengthier process. Indeed, Van Gelderen et al. (2015) state that 'over two thirds of the 161 people in our sample who expressed an intention to engage in [entrepreneurial] activities within a year ... took few or no steps to starting a new venture during the following 12 months' (p. 667). Different time frames would possibly be beneficial in capturing more extensively the degree to which intentions drive behaviour. 'It may also be the case that people deliberately postpone taking action: For example, until after they have saved some capital or gained some experience' (Kautonen et al., 2013: 670). To address these limitations and complement previous studies examining European samples, we use different time intervals and a US-based sample to examine whether

*Hypothesis 1. EI at different points in time positively predicts future start-up behaviour.*

## *The role of sex in EI-behaviour link*

Despite a growth in female entrepreneurship, empirical evidence shows that women are less likely to become entrepreneurs (Bosma and Levie, 2009; Kelley et al., 2013; Shane, 2008) and that men own more and larger businesses (Koellinger et al., 2013; Marlow, 2002; Santos et al., 2016; Westhead and Zolesvik, 2016). Social role theory (Eagly et al., 2000) offers one lens for explaining these differences; it proposes that men and women inhabit different social roles. Socially prescribed gender roles lead to stereotyping jobs as predominantly feminine or masculine (Eagly et al., 2000; Heilman, 1983). Heilman (1983) stresses that individuals aspire to jobs that are socially acceptable for their sex. These stereotypes are not only descriptive – denoting differences in how men and women actually are – but prescriptive as well – denoting norms regarding behaviours that are suitable for each, how men and women 'should' behave (Heilman, 2001).

In socially conditioned perceptions, entrepreneurship has been traditionally framed as a masculine career (Ahl, 2006) associated with stereotypically male traits such as aggressiveness, competitiveness and risk taking (Bryne and Fayolle, 2010; Gupta et al., 2009; Kickul et al., 2008). Commonly shared beliefs about gender roles can, therefore, shape the opportunities and incentives that individuals experience in pursuing certain occupations. The fact that an entrepreneurial career is gendered can also shape the relationship between female entrepreneurs and various service providers such as lenders and, as a result, limit women's ability to access the necessary resources or family support to succeed as entrepreneurs (Powell and Eddleston, 2013). Additionally, women may face more business–family conflict (Hsu et al., 2016; Justo et al., 2015) and, thus, perceive the environment as challenging and unsuitable for entrepreneurial activity (Zhao et al., 2005) with insurmountable barriers. Indeed, 'women tend to perceive themselves and their business environment in a less favourable light compared to men' (Langowitz and Minniti, 2007: 356), and 'perceive the entrepreneurial role as being less adequate for them' (Santos et al., 2016: 61). It is, therefore, not surprising that many studies (Baughn et al., 2006; Gupta et al., 2009; Kourilsky and Walstad, 1998; Kristiansen and Indarti, 2004; Langowitz and Minniti, 2007; Maes et al., 2014; Shinnar et al., 2014; Wilson et al., 2004, 2007, 2009; Zhao et al., 2005) found differences in EI between the sexes.

While gender and socially prescribed gender roles may lead to relatively low EI among women, some do have intentions to become entrepreneurs (Shane, 2008). The question regarding the likelihood that women who have strong intentions will act on those intentions by starting businesses remains largely unanswered. The role of sex in shaping the intention–behaviour link remains unclear. Kautonen et al. (2015) argue that 'the existence of a sizeable intention–action gap would point to the importance of studying additional factors rather than mere intentions for predicting and explaining entrepreneurial behaviour' (p. 656). Yet, in a recent study, these authors suggest that 'the intention–behaviour relationship maintains regardless of age, sex, gender, experience, education, and nature of entrepreneurial ambition' (Kautonen et al., 2015: 668). We assert that the role of sex needs to be further examined, especially given the fact that Kautonen et al.'s (2015) findings are based on a sample collected in two European nations, Austria and Finland, with about two-thirds of their sample located in Finland. The Finnish culture ranks low on masculinity (Hofstede, 2010) compared to Austria and the United States, which both rank at the high end of this scale. Feminine societies value cooperation and modesty, tend to be more consensus oriented and minimize inequality and occupational sex segregation (House et al., 2004). Thornton et al. (2011) state that implicit norms 'and cultural factors ... influence the individual career choice to be an entrepreneur and create a new business' (p. 106). Therefore, while sex may not play a role in explaining the intention–behaviour link in the Finnish cultural context, it may play an important role in a different cultural context, such as that of the United States, a nation in which occupational gender stereotyping remains significant (Heilman, 1983; Teig and Susskind, 2008). Indeed, Haus et al. (2013) found sex to influence EI differently in the United States and Europe asserting that 'women less frequently turn intention into implementation' (Haus et al., 2013: 145). Therefore, we propose to examine the role of sex in the intention–behaviour gap and hypothesize that

*Hypothesis 2. Sex moderates the relationship between EI and start-up behaviour such that the relationship is stronger for men than for women.*

## **Data and method**

### *Data collection*

Students enrolled in an introductory entrepreneurship course – a required course for all management majors – at a university in the south-eastern United States were surveyed over the course of

three academic years (Fall 2009 through Spring 2012). Surveys measured EI at four different points in time. This echoes Kautonen et al.'s (2015) recommendation that 'researchers should employ multiple measurements and aim to collect a panel data set' (p. 669) including data from more than two points in time.

The first wave of data (T1) was collected at the beginning of the semester before any instruction had taken place. The second wave (T2) took place at the conclusion of the course but before final examinations. T1 and T2 surveys were administered during class, using paper questionnaires, in each of the six semesters of the study period. Surveys included EI and entrepreneurial self-efficacy (ESE) scales as well as individual background information such as sex, age and the area of study (major). The third questionnaire (T3) was collected within six months of student graduation and was administered electronically; respondents were invited by e-mail to participate. In order to boost the response rate, those who did not respond due to undeliverable e-mail or other reasons were contacted by phone to request their participation. EI were measured again at T3. The final survey (T4) took place in 2015 and consisted of a short phone interview to assess the degree of engagement of respondents in start-up activities (entrepreneurial action).

We chose to allow for up to three years to pass between graduation (T3) and the final data collection wave (T4) due to the often complex and potentially lengthy process of starting a business. As Kautonen et al. (2015) warn, 'having too short of a timeframe could result in not polling respondents who intend to start a venture in the medium term' (p. 659). In addition, in their study using the Panel Study of Entrepreneurial Dynamics (PSED) – a nationally representative data set of US adults in the process of starting businesses – McMann and Vroom (2015) found that the average time an individual spent in the nascent stage of entrepreneurship was about three years. Recognizing that some students may start businesses more than three years after graduation, we developed and employed a dependent variable that included not only the start-up activities of graduates who had become entrepreneurs but also the initial steps undertaken by nascent entrepreneurs, that is, individuals who indicated that they had taken actual steps towards start-up but had not yet formally created a business.

## Sample

During the first and second waves (T1 and T2) of data collection, respondents were undergraduate students enrolled in an introductory entrepreneurship course. For the management majors (59.3%), the course was required for their degree. The fact that the course was mandatory for most respondents is important given Fayolle and Gailly's (2015) suggestion that bias may be introduced when samples consist of students participating in elective entrepreneurship courses because they are likely to be predisposed towards entrepreneurship. Although the first two waves of data collection occurred while study participants were enrolled as university students, the third wave of data collection (T3) took place within six months of graduation, and the last wave (T4) took place about three years after graduation. Therefore, our sample is not purely a student sample, which is often regarded as a limitation in entrepreneurship research.

As is the case in all longitudinal studies, some attrition occurred between our initial and final data collections (T1 and T4). While 758 complete surveys were collected in T1, only 179 complete cases were usable (i.e. answering both T1 and T4) at the conclusion of our study, with most of the attrition caused by a lower response rate at T4. The final sample of 179 responses constitutes a 23.6% response rate, which compares well with other longitudinal studies (Thompson and Surface, 2007). Among the 179 complete cases, 41 respondents or 22.9% (10 women and 31 men) had actually started a venture, and 10 of those 41 had already exited the venture they started. Another 17 (9.5%) were nascent entrepreneurs. Altogether, about a third of our sample engaged in either business start-up or preparatory activities, that is, they were entrepreneurs or nascent entrepreneurs.

Because some respondents who answered T1 and T4 were not reachable at T2 or T3, we have fewer cases for T2 ( $n=160$ ) and T3 ( $n=85$ ). The missing data were dealt with by listwise deletion in statistical analyses. Among the 179 respondents, 52 (29.1%) were women, and the average age at T1 was 21.3 years. Respondents majored in different fields with the majority being management majors ( $n=106$ ; 59.3%), 30 students (16.8%) being majors in other business disciplines and 43 students (24%) being non-business majors.

### *Non-response bias*

To rule out non-response bias, we tested the difference between the respondents who completed T2 or T3 surveys and those who did not. We coded the T2 surveys into two groups (response vs non-response) and ran multivariate analysis of variance (MANOVA) on the criterion variables of area of study (major), age, sex, ESE and entrepreneurial intention at the prior time (T1). None of the between-group differences were significant. We repeated the same procedure to create the response and non-response groups for T3 surveys. Again, none of the between-group differences were significant. We concluded that our sample is unlikely to suffer from non-response bias.

### *Measures*

*Dependent variable.* Entrepreneurial behaviour was assessed in the last wave of data collection (T4) through phone interviews. Individual actions were measured in a way that allowed for differentiation via categories of entrepreneurial behaviours consistent with Ajzen's (1991) suggested operationalization. Our dependent variable consists of three values based on three levels of entrepreneurial behaviours. Respondents were asked: 'Have you ever started your own business?' Those who responded affirmatively were coded as '2'. A follow-up question, 'When did you start your business?', indicated none had started their businesses prior to their university studies, allowing us to rule out any bias. For individuals who responded negatively, a follow-up question asked whether they planned to become self-employed in the next three to five years. Those who responded affirmatively were further asked: 'Have you taken steps towards starting your own business?' Respondents were asked to select from the following list the activities they had undertaken in preparation for business start-up: writing a business plan, securing financing, securing a location, purchasing raw materials/supplies, purchasing/leasing equipment, hiring/training employees and starting distribution/sale of product/service (Gatewood et al., 1995). All respondents who had a plan to start a business and indicated that they had also undertaken at least one of the above listed activities were coded as '1'. The group of respondents who had not started a business and did not plan to do so in the next three to five years was coded as '0'.

*Independent variables.* EI were measured in T1, T2 and T3 using Krueger et al.'s (2000) five-item measure ('1' = 'very unattractive/undesirable/unlikely/impractical' and '5' = 'very attractive/desirable/likely/practical'). We used the average score for EI at each time. Factor analysis was applied to construct the average score of EI, and Cronbach's alphas (0.83, 0.87 and 0.88 for T1, T2 and T3, respectively) confirmed reliability. Participants self-reported their sex at T1, and their responses were coded '0' for female and '1' for male.

### *Control variables*

*Age.* We control for age because the age of our respondents ranged from 19 to 30 years, and research shows that age affects start-up intention (Parker, 2004).

*Elective.* Although the course was a required part of the curriculum for management majors, other undergraduate students could also take the course as an elective. This self-selection could cause bias, add ‘noise’ to the model and confound the results. To control for potential bias, we added a dummy variable labelled ‘elective’, coded as ‘0’ for the students required to take the course and ‘1’ for students who chose to take the course as an elective.

*Time elapsed.* We surveyed students across three academic years (2009–2012) for T1 and T2 data, but T4 was taken at roughly the same time for all the participants (2015); for this reason, the time lapse for the respondents could vary, which in turn could affect responses regarding start-up or steps taken towards start-up. Therefore, the time lapse was included as a control variable in the analysis, for example, between T1 and T3 or between T3 and T4.

*ESE.* ESE was measured using Zhao et al.’s (2005) four items, ranked on a 5-point Likert scale (‘1’= ‘no confidence’ to ‘5’= ‘complete confidence’) in T1 through T3. Factor analysis was applied to construct the multidimensional ESE variables. Cronbach’s alphas were acceptable (0.85, 0.76 and 0.74 – for T1, T2 and T3, respectively). We included ESE as a control variable for all models because Ajzen’s (1991) TPB argues that the decision to perform, or not perform, behaviour is not only driven by behavioural intentions but also by perceived behavioural control. Perceived behavioural control is one of the three antecedents shaping behavioural intentions as well as a predictor of actual behaviour because ‘behavioural achievement depends jointly on motivation (intention) and ability (behavioural control)’ (Ajzen, 1991: 182). In the study of EI, perceived behavioural control has been frequently operationalized as ESE, and Ajzen (1991) argues it to be most compatible with Bandura’s (1986) concept of perceived self-efficacy. Consequently, ESE – defined as an individual’s ‘cognitive evaluation of personal capabilities in reference to the specific task of entrepreneurship’ (Chen et al., 1998: 312) – has been used extensively in entrepreneurship research. Given that the relationship between ESE and future start-up behaviour has been tested before (Kautonen et al., 2015) and that the focus of this study is to examine the EI-behaviour link and the moderating effect of sex, we do not propose the ESE-behaviour hypothesis but rather control for ESE to make the effects of EI and sex more profound.

We acknowledge that other factors such as entrepreneurial experience, family business background and education may affect actual start-up. As for education, our respondents were at the same education level at T4; hence, we had no variance in education level and did not control for it. Entrepreneurial experience and family business background have been shown to have a strong effect on ESE (Carr and Sequeira, 2007; Zhao et al., 2005). It is likely that if prior experience and family business background affect subsequent start-up, this effect would be captured through ESE. Because we included ESE as a control variable, we believe that our models, to a certain extent, account for the variation of prior experience and family business background.

### *Analytical procedure*

Given that our dependent variable has three ordered levels, we used ordered logit analysis, which is a statistical technique designed for testing an ordinal dependent variable ranging from 0 to 2 (Hamilton, 2003). Ordered logit analysis is computed on binomial theory and a chi-square probability distribution. Hence, it is important to examine the overall model fit in ordered logit analysis which is done using the function of log likelihood (Robson et al., 2013; Ucbasaran et al., 2009). This is a ‘badness-of-fit’ measure with a larger absolute value of log likelihood value indicating worse model fit (Warner, 2008). Ordered logit analysis does not produce a true  $R^2$ . Instead, a pseudo  $R^2$  is computed and used to indicate the percentage of variance explained (Warner, 2008).



In non-linear models, it is difficult to interpret the raw coefficients as economically meaningful. Furthermore, interaction effects ‘cannot be evaluated simply by looking at the sign, magnitude, or statistical significance of the coefficient on the interaction term ... Instead, the interaction terms require computing the cross-derivative’ (Ai and Norton, 2003: 129). Thus, we calculate average marginal effects to interpret the results (Ganter and Hecker, 2013). To examine the moderating effect of sex in the intention–behaviour link, we created an interaction term by first centring EI (in T1, T2 or T3) and then multiplying it by sex.

## Results

Descriptive statistics are presented in Table 1. The correlation matrix shows that sex is significantly and positively correlated with EI at T1, T2 and T3, confirming prior research suggestions that entrepreneurship may be perceived as a masculine career (Ahl, 2006; Gupta et al., 2009) with men having stronger EI than women (Baughn et al., 2006; Gupta et al., 2009; Kourilsky and Walstad, 1998; Kristiansen and Indarti, 2004; Langowitz and Minniti, 2007; Wilson et al., 2004, 2007, 2009; Zhao et al., 2005). The three EI measures taken at T1, T2 and T3 were highly correlated with each other, as are the three ESE measures at T1, T2 and T3. We acknowledge that this might imply autocorrelations among EI measures and among ESE measures at the three different points in time. Nevertheless, the objective of this article is to investigate different time intervals between EI and behaviour.

To test for no difference among EI at T1, T2 and T3, we used the equivalence test (Limentani et al., 2005). Compared to the conventional null hypothesis significance test, the equivalence test swaps the null hypothesis and the alternative hypothesis so that rejecting the null hypothesis (that there is a difference) indicates the acceptance of the alternative hypothesis (that there is no difference; see Limentani et al., 2005, or Weber and Popova, 2012, for a complete discussion). The equivalence test requires researchers to assume a theory-driven or evidence-driven effect size between two means, for example, EI at T1 and EI at T2. Thus, we looked into previous longitudinal studies and found that, in general, correlations between EI at different times are around or above 0.50, for example, 0.71 in Souitaris et al. (2007), 0.47 in Zhao et al. (2005) and 0.55 in Hsu et al. (2017). Hence, we set the effect size at 0.40 as a conservative test (Weber and Popova, 2012). The results of the equivalence tests (test of equivalence between the means of EI at T1 and EI at T2) with the effect size at 0.40 showed  $t=-1.16$  and  $p<0.01$ , thereby indicating that the alternative hypothesis that there is no difference between two means is accepted. We repeated the same procedure for EI at T2 and EI at T3 ( $t=-0.88$  and  $p<0.01$ ) and EI at T1 and EI at T3 ( $t=-0.10$  and  $p<0.01$ ). These results were consistent and showed that there was no significant difference between EI at T1, T2 and T3. We repeated the same procedures on the ESE measures at T1, T2 and T3 and found no significant difference in ESE at T1, T2 and T3. Therefore, we use EI and ESE at T1, T2 and T3 independently in the separate models.

Table 2 reports the results regarding our two hypotheses. We formulated three sets of ordered logit models (Models 1, 2 and 3) to examine the direct relationship between EI at one point of time (T1, T2 or T3) and actual start-up behaviour at T4 as well as the moderating effect of sex in the relationship, respectively. Within each ordered logit model, ‘Model a’ indicates the baseline model including only the control variables and the independent variable sex. The independent variable EI is added to ‘Model b’. ‘Model c’ examines the moderating effect of sex on the relationship between EI and actual start-up behaviour at T4 using the interaction variable EI multiplied by sex.

Model 1 depicts the relationship between EI at T1 (at the beginning of the course) and start-up at T4 and how this relationship is moderated by sex. Regarding the control variables, Model 1a shows that ESE is positively related to actual start-up behaviour ( $p<0.05$ ) and that individuals

**Table 1.** Descriptive statistics and correlations.

	Minimum	Maximum	Mean	SD	1	2	3	4	5	6	7	8	9
1. Actual start-up	0	2	0.55	0.84									
2. Age	19	30	21.31	1.64	0.02								
3. Sex <sup>a</sup>	0	1	0.71	0.46	0.04	0.06							
4. Elective <sup>b</sup>	0	1	0.41	0.49	-0.14	0.12	-0.30*						
5. EI at T1	-2.93	1.65	0	1	0.27*	0.13	0.15*	-0.12					
6. EI at T2	-2.41	1.62	0	1	0.36*	0.15	0.24*	-0.20*	0.76*				
7. EI at T3	-2.05	1.73	0	1	0.29*	0.09	0.24*	-0.16	0.63*	0.71*			
8. ESE at T1	-4.82	1.58	0	1	0.15*	0.01	0.07	0.01	0.37*	0.27*	0.34*		
9. ESE at T2	-3.43	1.72	0	1	0.22*	0.07	0.02	-0.11	0.43*	0.52*	0.49*	0.43*	
10. ESE at T3	-3.60	1.74	1	1	0.11	0.06	0.02	-0.06	0.41*	0.45*	0.58*	0.52*	0.60*

SD: standard deviation; EI: entrepreneurial intention; ESE: entrepreneurial self-efficacy.

N ranging from 77 to 179 due to missing data in the correlation pairs.

<sup>a</sup>Sex is coded as 0 = female and 1 = male.

<sup>b</sup>Elective is coded as 0 = management majors taking the course as a requirement versus 1 = other majors taking the course as an elective.

\*p < 0.05.

**Table 2.** Ordered logit models relating to the likelihood of actual start-up.

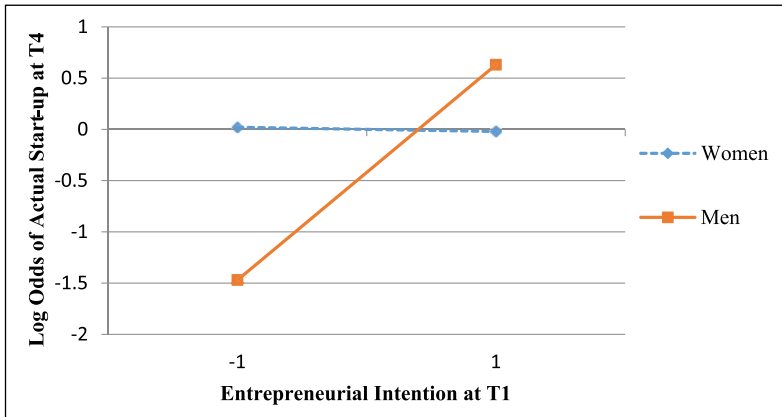
Dependent variable: actual start-up at T4									
	Model 1a	Model 1b	Model 1c	Model 2a	Model 2b	Model 2c	Model 3a	Model 3b	Model 3c
<b>Controls</b>									
Time elapsed	0.16	0.25	0.26	0.15	0.12	0.14	-0.04	-0.23	-0.28
Age	0.07	0.01	0.01	0.13	0.03	-0.01	0.13	0.12	0.10
Elective <sup>a</sup>	-0.67 <sup>+</sup>	-0.64 <sup>+</sup>	-0.74 <sup>*</sup>	-0.72 <sup>+</sup>	-0.56	-0.56	-0.68	-0.64	-0.82
ESE at T1	0.29 <sup>+</sup>	0.10	0.08	0.55 <sup>**</sup>	0.14	0.12	0.30	-0.09	-0.14
ESE at T2									
ESE at T3									
<b>Independent variables</b>									
EI at T1		0.66 <sup>**</sup>	-0.02		0.97 <sup>**</sup>	0.47		0.78 <sup>*</sup>	-0.38
EI at T2								-0.38	-0.13
EI at T3									
Sex <sup>b</sup>	-0.10	-0.31	-0.42	-0.07	-0.32	-0.58	0.01	-0.38	-0.13
<b>Interaction terms</b>									
Sex x EI at T1			1.07 <sup>**</sup>						
Sex x EI at T2									
Sex x EI at T3						0.88 <sup>+</sup>			
N	179	178	178	160	160	160	85	84	1.48 <sup>*</sup>
Log likelihood	-143.94	-137.52	-134.14	-120.07	-112.68	-111.09	-68.77	-65.73	-63.66
$\chi^2$	7.79	19.84 <sup>**</sup>	26.59 <sup>**</sup>	14.97 <sup>**</sup>	29.74 <sup>**</sup>	32.92 <sup>**</sup>	4.32	9.63	13.77 <sup>*</sup>

EI: entrepreneurial intention; ESE: entrepreneurial self-efficacy.

<sup>a</sup>Elective is coded as 0 = Management majors taking the course as a requirement versus 1 = other majors taking the course as an elective.

<sup>b</sup>Sex is coded as 0 = female and 1 = male.

+ $p < 0.10$ ; \* $p < 0.05$ ; \*\* $p < 0.01$ .



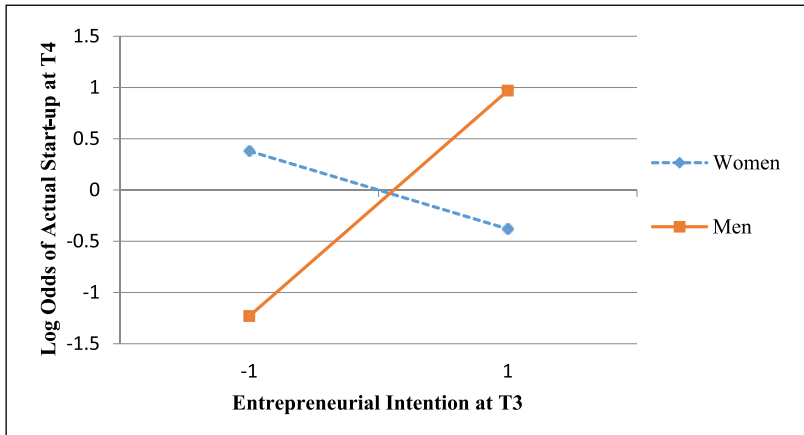
**Figure 1.** Moderating effect of sex on intention at T1 and start-up behaviour at T4.

enrolled in an entrepreneurship course as an elective (rather than a required course) are more likely to start a business ( $p < 0.10$ ). Although not hypothesized in this article, both results are consistent with existing literature. The TPB suggests that individuals with higher ESE have higher EI and are more likely to believe that they possess viable ideas for a business and the capability to carry these ideas into actions. Therefore, individuals with higher ESE are more likely to start a business (Krueger et al., 2000; Segal et al., 2002). Also, Fayolle and Gailly (2015) argue that students participating in elective entrepreneurship courses are likely to have some level of predisposition towards entrepreneurship.

Model 1b shows the relationship between EI at T1 and start-up behaviour at T4. We find that EI at T1 significantly ( $p < 0.01$ ) predicted start-up behaviour at T4. The interpretation of the coefficients in ordered logit analysis is different than they are in a linear relationship (e.g. ordinary least squares (OLS) models). Therefore, marginal effects were calculated in order to make the raw coefficients economically meaningful. Since our dependent variable includes three values, with values '1' (i.e. taking steps towards start-up) and '2' (i.e. having actually started a business) being of interests in the current investigation, marginal effects are calculated for predicting these two values. Results show that EI at T1 increases the likelihood of taking steps to start a business at T4 by 2% ( $dy/dx = 0.02$ ,  $p < 0.01$ ) and the likelihood of actually starting a business at T4 by 11% ( $dy/dx = 0.11$ ,  $p < 0.01$ ).

Finally, Model 1c shows that the effect of EI at T1 on actual start-up behaviour at T4 is moderated by sex. The interaction variable  $sex \times EI$  is significant at 1% level ( $p < 0.01$ ), indicating a stronger effect for men. The marginal effect test indicates that the effect of EI at T1 on the likelihood of taking steps towards start-up is 4% ( $dy/dx = 0.04$ ,  $p < 0.05$ ) stronger for men and that the effect on the likelihood of actually starting a business is 17% ( $dy/dx = 0.17$ ,  $p < 0.01$ ) stronger for men. To make this finding more transparent, we plotted the dependent variable, actual start-up, as a function of sex and EI at T1 (see Figure 1) at high and low levels following the recommendations of methodologists (Aiken and West, 1991). Consistent with our empirical result, Figure 1 indicates the different effect of sex on the EI-behaviour link. For men, the likelihood of starting a business increases with increasing EI, while the relationship between EI and actual start-up does almost not exist for women. Moreover, when both men and women have equally high EI (above the mean value), men are more likely to act on their intentions to start a business than women.

Model 2 examined the effect of the predictors measured at T2 (at the end of the course) on actual start-up at T4. In Model 2a, consistent with the finding in Model 1a, ESE at T2



**Figure 2.** Moderating effect of sex on intention at T3 and start-up behaviour at T4.

significantly predicted actual start-up at T4 ( $p < 0.01$ ). Model 2b shows the effect of EI at T2 on actual start-up behaviour at T4. Similar to Model 1b, EI at T2 also significantly ( $p < 0.01$ ) predicted start-up at T4. While interpreting results using marginal effects, we find that EI at T2 increases the likelihood of taking steps to start a business at T4 by 3% ( $dy/dx = 0.03, p < 0.01$ ) and the likelihood of actually starting a business at T4 by 14% ( $dy/dx = 0.14, p < 0.01$ ). Finally, Model 2c tests the moderating effect of sex. We observe a marginally significant and positive coefficient of the interaction variable  $sex \times EI$  ( $p < 0.10$ ). The marginal effect test indicates that the effect of EI at T2 on the likelihood of taking steps towards start-up is 3% ( $dy/dx = 0.03, p < 0.10$ ) stronger for men and that the effect on the likelihood of actually starting a business is 12% ( $dy/dx = 0.12, p < 0.10$ ) stronger for men.

Models 3a–3c, which examine the effect of the predictors measured within six months of graduation on actual start-up three years after graduation, are intended to replicate the findings in Models 1 and 2. Surprisingly, ESE was not significantly related to actual start-up in any of the three models. In Model 3b, EI at T3 still predicts actual start-up behaviour at T4 ( $p < 0.05$ ); however, the significance level dropped compared to Models 1 and 2. This is possibly due to the small sample size in T3 ( $n = 84$ ), which reduced statistical power. When interpreting the effects of EI at T3 using marginal effects, we find that EI at T3 increases the likelihood of taking steps towards start-up at T4 by 4% ( $dy/dx = 0.04, p < 0.05$ ) and the likelihood of actually starting a business at T4 by 12% ( $dy/dx = 0.12, p < 0.05$ ). Model 3c examines the moderating effect of sex on the relationship between EI at T3 and actual start-up behaviour at T4. The interaction variable  $sex \times EI$  indicates a stronger direct effect between EI and behaviour among male respondents than among female respondents ( $p < 0.05$ ). The marginal effect test indicates that the effect of EI at T3 on the likelihood of taking steps towards start-up is 7% ( $dy/dx = 0.07, p < 0.10$ ) stronger for men than for women and that the effect on the likelihood of actually starting a business is 21% ( $dy/dx = 0.21, p < 0.05$ ) stronger for men than for women. Using the same procedures as in Figure 1, Figure 2 is plotted to visualize the moderating effect of sex on the relationship between EI at T3 and the actual start-up behaviour at T4. Figure 2 shows that the likelihood of starting a business increases along with the increase in EI among men, while an opposite effect is observed among women. The negative relationship between EI and actual start-up for women observed in Figure 2 is interesting but may not be meaningful as the zero-order coefficient of sex in Model 3c is not significant ( $p > 0.10$ ). Given the significant interaction term in Model 3c, we can only conclude that the effect of EI on start-up is stronger for

men than women. Additionally, men are more likely to act on their intentions to start a business compared to women when they both have equally high EI.

Considering all the models together, we conclude that both the main effect of EI (Hypothesis 1) and the moderating effect of sex in the intention–behaviour link (Hypothesis 2) receive support in most models across the four waves of data, except for Model 2c in which the interaction variable was only marginally significant ( $p < 0.10$ ).

### *Post hoc analyses*

Our data showed that out of 13 students (five women and eight men) who indicated at T1 no or very weak intentions to start businesses (averaged  $EI \leq 2$  on a 1- to 5-point scale), four (two women and two men) had actually started a business. That is, 40% of the female ‘non-intenders’ (Kautonen et al., 2013) and 25% of their male counterparts became ‘accidental entrepreneurs’ (Fitzsimmons and Douglas, 2011). This suggests that female ‘non-intenders’ (Kautonen et al., 2013) might be more likely than men to become accidental entrepreneurs (Fitzsimmons and Douglas, 2011). Unfortunately, the number of accidental entrepreneurs in our data set was not large enough for us to conduct additional statistical analyses. Further investigations into the sex difference in becoming accidental entrepreneurs should be informative. Additionally, identifying the triggering event which motivated women who had no intentions to start businesses to actually become entrepreneurs would likely be valuable. Qualitative research building on interviews of female accidental entrepreneurs should precede statistical studies in order to better understand these entrepreneurs and determine what types of data are needed for effective statistical studies.

Because we collapsed all the steps taken towards start-up, responses were aggregated into one level in the dependent variable (coded as 1) regardless of the number of start-up-related activities respondents engaged in. This may have distorted our results. To assess this potential problem, we created a new dependent variable with 0 for ‘no action’, 1–7 for different levels of nascency (the number of tasks that the respondents had performed), and 8 for start-up. The same regression models were run using this alternative dependent variable as a robustness check. Results matched those for the original dependent variable, thereby indicating that our results are robust to the method used to code the dependent variable.

Our results showed that ESE at each time was not significantly related to behaviour three years after graduation. Given that ESE is a strong predictor of EI, the non-significant finding is surprising. To further understand the relationships among ESE, EI and actual behaviour, we used Baron and Kenny’s (1986) procedure to test potential mediating effect of EI on the relationship between ESE and actual behaviour. The results showed that for ESE and EI at each time (T1, T2 and T3), EI fully mediated the effect of ESE on actual start-up behaviours. Hence, ESE does not appear to have a direct effect on actual start-up behaviours in our sample.

## **Discussion**

Our first goal in this study was to apply both theory and empirical analysis to establish the link between EI and start-up behaviours. Ajzen’s (1991) TPB builds a strong theoretical argument supporting the EI-behaviour link, and a three-year longitudinal study with four waves of data collection offered the kind of rare, primary data needed to confirm it. We are not the first to confirm the EI-behaviour link (see Goethner et al., 2012; Kautonen et al., 2013, 2015; Kolvereid and Isaksen, 2006; Rauch and Hulsink, 2015; Van Gelderen et al., 2015). We could have cited these studies and omitted our first goal, but had we done so, we would have had to acknowledge that the EI-behaviour link had not yet been confirmed in the national context of our study because – to our knowledge – no

prior study has examined the EI-behaviour link in the US context. Therefore, we confirmed the EI-behaviour link – Hypothesis 1 – in the US context rather than incorporating such a weakness into our study.

In reviewing entrepreneurship research, Gartner (1985) called for greater emphasis on differences among entrepreneurs. Applying this mandate to the study of the EI-behaviour link suggests that differences in entrepreneurs may affect their propensity to act on their intentions. Our second goal focused on one of the most fundamental differences among entrepreneurs – their sex – and how this difference could affect the EI-behaviour link. As originally formulated, the TPB does not consider the impact of sex on the relationship between intentions and behaviours (Ajzen, 1991). For guidance as to how sex might affect the EI-behaviour link, we turned to social role theory (Eagly, 1987) and the gendered entrepreneurship perspective (Gianakos, 1995; Glick et al., 1995; Gupta et al., 2008, 2009), which suggest that entrepreneurship is a gendered process in that women and men face different social expectations and different levels of support in their environment when it comes to entrepreneurship (Langowitz and Minniti, 2007; Wilson et al., 2004, 2007, 2009; Zhao et al., 2005). Because the normative representation of entrepreneurship is dominated by masculinity (Henry et al., 2016; Zampetakis et al., 2016), lower social expectations to engage in entrepreneurship, and weaker anticipated environmental support for their entrepreneurial endeavours, might dampen women's EI. Although we did not formulate this as a hypothesis, we did find in our sample that women have lower EI than men (see Table 1). Lower social expectations and environmental support could also make women who intend to start businesses less likely to actually do so. We found confirmation for this in our empirical analysis, that is, that sex moderates the EI-behaviour link. Based on our results, it appears that socially prescribed gender roles suppress women's intentions to enter entrepreneurship and also weaken their propensity to act on their intentions. This two-step suppression of women's entrepreneurial behaviours could account for much of the lower rates of entrepreneurial activity among women in the United States.

As with our examination of the EI-behaviour link, we are not the first to investigate the impact of sex on the EI-behaviour link. Kautonen et al. (2015) tested for a moderating effect of sex on the EI-behaviour link in a sample drawn from Austria and Finland. Interestingly, Kautonen et al. (2015) found no such significant effect. These conflicting findings highlight not only the need for replication studies but also the need for careful reflection on differences among entrepreneurs and across national contexts. The effect of sex is likely to differ in diverse national contexts given differences in gender roles across cultures (Thornton et al., 2011).

## **Limitations and extensions**

There are a number of limitations to our study, several of which present promising directions for future research. First, our study examined entrepreneurs in only one national context (that of the United States). Future research could investigate the EI-behaviour link and the impact of sex on this link in several national contexts. An interesting methodology would be to create a natural experiment by selecting samples from nations with low and high levels of occupational typecasting. Such research could shed light on the conflicting results between those of this study and that of Kautonen et al. (2015).

Second is the lack of variation in educational attainment. All our respondents were college graduates from the same university. The relationship between EI and start-up behaviours – as well as the impact of sex on that relationship – may be different for individuals with different levels of education. Indeed, some researchers believe that graduate students exhibit higher levels of self-confidence in their ability to successfully complete the tasks associated with starting a business (Florin et al., 2007). Another potential source of problematic homogeneity in our sample is that all

subjects had completed at least one introductory entrepreneurship course by the time we assessed their entrepreneurial behaviours. Research suggests that once individuals have gained relevant knowledge through an entrepreneurship education programme, they have more realistic expectations regarding business ownership and may have weaker EI (Oosterbeek et al., 2010; Piperopoulos and Dimov, 2015). A sample with variance in the amount of entrepreneurship education might have greater variance in EI and actual start-up. Similarly, drawing our sample from a single university introduced a source of homogeneity that potentially limits the generalizability of our findings even within the United States.

Third, there was very little variance in the type of business that students intended to start. Douglas (2013) distinguished between growth-oriented and independence-oriented ventures, finding that ESE affects student EI when intending to start growth-oriented ventures but not for independence-oriented ventures. We captured the type of business started in T4; almost all of the 41 businesses started by the respondents were independence-oriented businesses in domains such as massage therapy, fly-fishing guides, tattoo shop, craft classes, and so on. The one exception was an IT consulting/web design company that is arguably growth oriented. Surprisingly, our findings are inconsistent with Douglas' (2013). While Douglas (2013) did not find a significant effect of ESE on EI for independence-oriented ventures, EI did have a significant effect on start-up behaviours in our sample of almost all independence-oriented start-ups.

Fourth, although longer than that employed in most other studies, our maximum window for detecting start-up behaviours was only three years after graduation. Some graduates may take longer than three years to start a business, and these graduates could be systematically different in ways that would affect our findings. Although collection of the necessary data would be formidable, survival analysis could provide deep insight into the factors affecting not just whether intentions lead to start-up behaviours but also into the factors affecting how long this process takes. Not controlling for industry is another limitation. The view of entrepreneurship as an appropriate career for women may vary across different vocations or industries (Gupta et al., 2009). For instance, wedding planning may be perceived as better suited for women; if so, women who intend to become self-employed wedding planners may be more likely to act on this specific intention. The gender-congruence bias (Wieland et al., 2013) may thus require a model different from that which we employed. Implementing a fifth wave of data collection to assess participant masculinity and femininity traits – using Bem's (1991) sex-role inventory for example – could help us identify the degree to which gender traits shape the decision to start-up and whether they impact the type of business selected. This could add further detail to our suggestion that sex matters in the relationship between EI and actual start-up.

Finally, the exit rate in our study – the number of individuals who started a business since graduation but had already exited it when the follow-up data collection was conducted – was surprisingly high – about 25%, an observation that highlights the importance of further study of entrepreneurial exit. Jenkins and McKelvie (2016) have called for more research on the drivers of business exit and how exit is perceived by entrepreneurs. It would be productive to assess the reasons for business exit among these individuals as well as their subsequent serial EI.

## **Practical implications**

The results of our study imply that EI matter because they affect start-up activities. By showing the EI-behaviour link, our results suggest that a potential to increase start-up activity through stimulating EI exists. If effective techniques to increase EI could be developed, then our study suggests that these techniques could be used to increase start-up activity, which is emphasized as a means for increasing employment and economic growth. However, such benefits are not guaranteed because



an increase in EI caused by a technique such as a training programme might not necessarily lead to more start-ups. To increase start-up activity, the technique would have to increase EI in a way that also preserves the EI-behaviour link. This is a subtle but very important point. Designing an effective technique for increasing start-up activity by fostering EI requires careful study of not only the impact of the technique on EI but also its impact on the link between EI and start-up activity.

Another important implication of our research is that an entrepreneur's sex matters. This is rooted in our findings that American men are more likely to act on their intentions than their female counterparts. Efforts to increase start-up activity by fostering EI might, therefore, be more effective if the initiatives target men. That said, targeting women may lead to more gender balance among nascent entrepreneurs. In order to stimulate female entrepreneurship, it may be necessary to not only strengthen EI but at the same time to frame the way in which women perceive an entrepreneurial career. For students, this could possibly be achieved through use of case studies focusing on female entrepreneurs or successful female entrepreneurs who could serve as guest speakers. Research on the pedagogy of educating women in entrepreneurship could shed light on which techniques are most effective in changing how female students perceive an entrepreneurial career and on how women can be encouraged to act on their EI. For example, Piperopoulos and Dimov (2015) show differences in the impact on EI between theoretically oriented versus practically oriented entrepreneurship courses. A similar approach could be used to identify which educational approach would be more effective in generating stronger EI and subsequent start-up activities by female students.

## Conclusion

This study illuminates an important but insufficiently examined entrepreneurship phenomenon, namely, the transformation of EI into start-up behaviours as well as the impact of sex on this process. Examining this phenomenon requires multi-year, longitudinal data, which is likely why there has been insufficient research on this phenomenon. We drew theoretical support for the EI-behaviour link from the TPB and found confirmation of the link in a longitudinal data set collected in four waves over a six-year period. While there are prior studies that confirm this link, ours is one of the first – to our knowledge – to confirm the EI-behaviour link in the US context. Guided by social role theory and gendered entrepreneurship, we hypothesized sex would moderate the impact of EI on start-up behaviours. In our review of the literature, we found only one study that examined this moderating relationship, but this study (Kautonen et al., 2015), which employed an Austrian/Finish sample, found no significant impact of sex on the EI-behaviour link. In contrast, we found a significant moderation in our US-based sample. These conflicting results are confounding and require further research to provide clarification. Yet, they are also encouraging. If women are just as likely as men to act on their EI in some countries, then perhaps interventions can be developed for countries in which they are not. These conflicting results also highlight the importance of comparing studies from different countries, of conducting multi-country studies and – more generally – of viewing entrepreneurship from an international perspective.

## Funding

The author(s) received no financial support for the research, authorship and/or publication of this article.

## References

- Ahl H (2006) Why research on women entrepreneurs needs new directions. *Entrepreneurship: Theory and Practice* 30: 595–622.

- Ai C and Norton EC (2003) Interaction terms in logit and probit models. *Economics Letters* 80(1): 123–129.
- Aiken LS and West SG (1991) *Multiple Regression: Testing and Interpreting Interactions*. Newbury Park, CA; London: Sage.
- Ajzen I (1991) The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 50: 179–211.
- Allen E, Langowitz N and Minniti M (2007) *The 2006 Global Entrepreneurship Monitor Special Topic Report: Women in Entrepreneurship*. Boston, MA: Center for Women Leadership, Babson College.
- Bandura A (1986) *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice Hall.
- Baron RM and Kenny DA (1986) The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 51: 1173–1182.
- Baughn CC, Cao JR, Le LTM, et al. (2006) Normative, social and cognitive predictors of entrepreneurial interest in China, Vietnam and the Philippines. *Journal of Developmental Entrepreneurship* 11(1): 57–77.
- Bem SL (1974) The measurement of psychological androgyny. *Journal of Consulting and Clinical Psychology* 42(2): 155–162.
- Bem SL (1991) *Bem Sex Role Inventory: Professional Manual*. Palo Alto, CA: Consulting Psychology Press.
- Bosma N and Levie J (2009) Global entrepreneurship monitor: 2009 executive report. Available at: <http://www.gemconsortium.org> (accessed 4 October 2010).
- Bryne J and Fayolle A (2010) A feminist inquiry into entrepreneurship training. In: Smallbone D, Leitao J, Raposo M, et al. (eds) *The Theory and Practice of Entrepreneurship*. Cheltenham: Edward Elgar Publishing, pp.76–100.
- Butler J (1990) Gender trouble, feminist theory and psychoanalytic discourse. In: Nicholson LJ (ed.) *Feminism/Postmodernism*. New York: Routledge, pp.324–340.
- Carr JC and Sequeira JM (2007) Prior family business exposure as intergenerational influence and entrepreneurial intent: A theory of planned behavior approach. *Journal of Business Research* 60(10): 1090–1098.
- Chen CC, Greene PG and Crick A (1998) Does entrepreneurial self-efficacy distinguish entrepreneurs from managers? *Journal of Business Venturing* 13: 295–316.
- Díaz-García M and Jiménez-Moreno J (2010) Entrepreneurial intentions: The role of gender. *International Entrepreneurship and Management Journal* 6: 261–283.
- Douglas JD (2013) Reconstructing entrepreneurial intentions to identify predisposition for growth. *Journal of Business Venturing* 28: 633–651.
- Eagly A (1987) *Sex Differences in Social Behavior: A Social Role Interpretation*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Eagly AH, Wood W and Diekmann AB (2000) Social role theory of sex differences and similarities: A current appraisal. In: Eckes T and Trautner HM (eds) *The Developmental Social Psychology of Gender*. Mahwah, NJ: Lawrence Erlbaum Associates, pp.123–174.
- Fayolle A and Gailly B (2015) The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence. *Journal of Small Business Management* 53(1): 75–93. DOI: 10.1111/jsbm.12065.
- Fitzsimmons JR and Douglas EJ (2011) Interaction between feasibility and desirability in the formation of entrepreneurial intentions. *Journal of Business Venturing* 26(4): 431–440.
- Florin J, Karri R and Rossiter N (2007) Fostering entrepreneurial drive in business education: An attitudinal approach. *Journal of Management Education* 31(1): 17–42.
- Ganter A and Hecker A (2013) Persistence of innovation: Discriminating between types of innovation and sources of state dependence. *Research Policy* 42(8): 1431–1445.
- Gartner WB (1985) A conceptual framework for describing the phenomenon of new venture creation. *Academy of Management Review* 10(4): 696–706.
- Gatewood EJ, Shaver KG and Gartner WB (1995) A longitudinal study of cognitive factors influencing start-up behaviors and success at venture creation. *Journal of Business Venturing* 10(5): 371–391.
- Gianakos I (1995) The relation of sex-role identify to career decision-making self-efficacy. *Journal of Vocational Behavior* 46(2): 131–143.

- Glick P, Wilk K and Perreault M (1995) Images of occupations: Components of gender and status in occupational stereotypes. *Sex Roles* 32(9–10): 565–582.
- Goethner M, Obschonka M, Silbereisen RK, et al. (2012) Scientists' transition to academic entrepreneurship: Economic and psychological determinants. *Journal of Economic Psychology* 33(3): 628–641.
- Goktan AB and Gupta VK (2015) Sex, gender, and individual entrepreneurial orientation: Evidence from four countries. *International Entrepreneurship and Management Journal* 11(1): 95–112.
- Gupta VK, Turban DB and Bhawe NM (2008) The effect of gender stereotype activation on entrepreneurial intentions. *Journal of Applied Psychology* 93(5): 1053–1061.
- Gupta VK, Turban DB, Wasti SA, et al. (2009) The role of gender stereotypes in perceptions of entrepreneurs and intentions to become an entrepreneur. *Entrepreneurship: Theory and Practice* 33(2): 397–417.
- Hamilton LC (2003) *Statistics with Stata*. Belmont, CA: Duxbury Thomson Learning.
- Haus I, Steinmetz H, Isidor R, et al. (2013) Gender effects on entrepreneurial intention: A meta-analytical structural equation model. *International Journal of Gender and Entrepreneurship* 5(2): 130–156.
- Heilman ME (1983) Sex bias in work settings: The lack of fit model. *Research in Organizational Behavior* 5: 269–298.
- Heilman ME (2001) Description and prescription: How gender stereotypes prevent women's ascent up the organizational ladder. *Journal of Social Issues* 57: 657–674.
- Henry C, Foss L and Ahl H (2016) Gender and entrepreneurship research: A review of methodological approaches. *International Small Business Journal* 34(3): 217–241.
- Hofstede GH (2010) *Cultures and Organizations: Software of the Mind*. New York: McGraw-Hill.
- House RJ, Hanges PJ, Javidan M, et al. (2004) *Culture, Leadership, and Organizations: The Globe Study of 62 Societies*. Thousand Oaks, CA: Sage.
- Hsu DK, Wiklund J and Cotton RD (2017) Success, failure, and entrepreneurial reentry: An experimental assessment of the veracity of self-efficacy and prospect theory. *Entrepreneurship: Theory and Practice* 41(1): 19–47.
- Hsu DK, Wiklund J, Anderson SE, et al. (2016) Entrepreneurial exit intentions and the business-family interface. *Journal of Business Venturing* 31(6): 613–627.
- Jenkins A and McKelvie A (2016) What is entrepreneurial failure? Implications for future research. *International Small Business Journal* 34(2): 176–188.
- Justo R, DeTienne DR and Sieger P (2015) Failure or voluntary exit? Reassessing the female underperformance hypothesis. *Journal of Business Venturing* 30(6): 775–792.
- Kautonen T, van Gelderen M and Fink M (2015) Robustness of the theory of planned behavior in predicting entrepreneurial intentions and actions. *Entrepreneurship: Theory and Practice* 39(3): 655–675.
- Kautonen T, van Gelderen M and Tornikoski ET (2013) Predicting entrepreneurial behavior: A test of the theory of planned behavior. *Applied Economics* 45(6): 697–707.
- Kelley DJ, Brush CG, Greene PG, et al. (2013) *The Global Entrepreneurship Monitor 2012 Global Women's Report*. Boston, MA: Babson College.
- Kelley DJ, Brush CG, Greene PG, et al. (2015) *The Global Entrepreneurship Monitor Special Report: Women's Entrepreneurship 2015*. Boston, MA: Babson College.
- Kickul J, Wilson F, Marlino D, et al. (2008) Are misalignments of perceptions and self-efficacy causing gender gaps in entrepreneurial intentions among our nation's teens? *Journal of Small Business and Enterprise Development* 15(2): 321–335.
- Koellinger P, Minniti M and Schade C (2013) Gender differences in entrepreneurial propensity. *Oxford Bulletin of Economics and Statistics* 57(2): 213–234.
- Kolvareid L (1996) Prediction of employment status choice intentions. *Entrepreneurship: Theory and Practice* 21(1): 47–61.
- Kolvareid L and Isaksen E (2006) New business start-up and subsequent entry in to self-employment. *Journal of Business Venturing* 21(6): 866–885.
- Kourilsky ML and Walstad WB (1998) Entrepreneurship and female youth: Knowledge, attitudes, gender differences, and educational practices. *Journal of Business Venturing* 13(1): 77–88.
- Kristiansen S and Indarti N (2004) Entrepreneurial intention among Indonesian and Norwegian students. *Journal of Enterprising Culture* 12(1): 55–78.

- Krueger NF, Reilly MD and Carsrud AL (2000) Competing models of entrepreneurial intentions. *Journal of Business Venturing* 15(5–6): 411–432.
- Langowitz N and Minniti M (2007) The entrepreneurial propensity of women. *Entrepreneurship: Theory and Practice* 31(3): 341–364.
- Limentani GB, Ringo MC, Ye F, et al. (2005) Beyond the t-test: Statistical equivalence testing. *Analytical Chemistry* 77(11): 221–237.
- Liñan F (2008) Skill and value perceptions: How do they affect entrepreneurial intentions? *International Entrepreneurship and Management Journal* 4: 257–272.
- Liñan F and Chen YW (2009) Development and cross-cultural application of a specific instrument to measure entrepreneurial intentions. *Entrepreneurship: Theory and Practice* 33(3): 593–617.
- Lortie J and Castogiovanni G (2015) The theory of planned behavior in entrepreneurship research: What we know and future directions. *International Entrepreneurship and Management Journal* 11(4): 935–957.
- McMann BT and Vroom G (2015) Opportunity evaluation and changing beliefs during the nascent entrepreneurial process. *International Small Business Journal* 33(6): 612–637.
- Maes J, Leroy H and Sels L (2014) Gender differences in entrepreneurial intentions: A TPB multi-group analysis at factor and indicator level. *European Management Journal* 32(5): 784–794.
- Marlow S (2002) Women and self-employment: A part of or apart from theoretical construct? *International Journal of Entrepreneurship and Innovation* 3(2): 83–91.
- Moriano JA, Gorgievski M, Laguna M, et al. (2011) A cross-cultural approach to understanding entrepreneurial intentions. *Journal of Career Development* 38(1): 1–24.
- Oosterbeek H, van Praag M and Ijsselstein A (2010) The impact of entrepreneurship education on entrepreneurship skills and motivation. *European Economic Review* 54: 442–454.
- Parker SC (2004) *The Economics of Self-Employment and Entrepreneurship*. New York: Cambridge University Press.
- Piperopoulos P and Dimov D (2015) Burst bubbles or build steam? Entrepreneurship education, entrepreneurial self-efficacy, and entrepreneurial intentions. *Small Business Management* 43(4): 970–985.
- Powell GN and Eddleston KA (2013) Linking family-to-business enrichment and support to entrepreneurial success: Do female and male entrepreneurs experience different outcomes? *Journal of Business Venturing* 28(2): 261–280.
- Rauch A and Hulsink W (2015) Putting entrepreneurship education where the intention to act lies: An investigation into the impact of entrepreneurship education on entrepreneurial behavior. *Academy of Management Learning and Education* 14(2): 187–204.
- Robson P, Akuetteh C, Stone I, et al. (2013) Credit-rationing and entrepreneurial experience: Evidence from a resource deficit context. *Entrepreneurship and Regional Development* 25(5–6): 349–370.
- Santos FJ, Roomi MA and Liñan F (2016) About gender differences and the social environment in the development of entrepreneurial intentions. *Journal of Small Business Management* 54(1): 49–66.
- Schlaegel C and Koening M (2012, August 3–7) Determinants of entrepreneurial intent: A meta-analytic test and integration of competing models. Paper presented at the Academy of Management Annual Meeting, Boston, MA.
- Segal G, Borgia D and Schoenfeld J (2002) Using social cognitive career theory to predict self-employment goals. *New England Journal of Entrepreneurship* 5(2): 47–56.
- Shane SA (2008) *The Illusions of Entrepreneurship: The Costly Myths that Entrepreneurs, Investors, and Policy Makers Live by*. New Haven, CT: Yale University Press.
- Shinnar RS, Hsu DK and Powell BC (2014) Self-efficacy, entrepreneurial intentions, and gender: Assessing the impact of entrepreneurship education longitudinally. *The International Journal of Management Education* 12(3): 561–570.
- Souitaris V, Zerbinati S and Al-Laham A (2007) Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources. *Journal of Business Venturing* 22(4): 566–591.
- Teig S and Susskind JE (2008) Truck driver or nurse? The impact of gender roles and occupational status on children's occupational preferences. *Sex Roles* 58: 848–863.

- Thompson LF and Surface EA (2007) Employee surveys administered online: Attitudes toward the medium, nonresponse, and data representativeness. *Organizational Research Methods* 10(2): 241–261.
- Thornton PH, Ribeiro-Soriano D and Urbano D (2011) Socio-cultural factors and entrepreneurial activity: An overview. *International Small Business Journal* 29(2): 105–118.
- Ucbasaran D, Westhead P and Wright M (2009) The extent and nature of opportunity identification by experienced entrepreneurs. *Journal of Business Venturing* 24(2): 99–115.
- Van Gelderen M, Brand M, van Praag M, et al. (2008) Explaining entrepreneurial intentions by means of the theory of planned behavior. *Career Development International* 13(6): 538–559.
- Van Gelderen M, Kautonen T and Fink M (2015) From entrepreneurial intentions to actions: Self-control and action-related doubt, fear, and aversion. *Journal of Business Venturing* 30: 655–673.
- Warner RM (2008) *Applied Statistics: From Bivariate through Multivariate Techniques*. Thousand Oaks, CA: Sage.
- Weber R and Popova L (2012) Testing equivalence in communication research: Theory and application. *Communication Methods and Measures* 6(3): 190–213.
- Westhead P and Zolesvik M (2016) Entrepreneurship education and entrepreneurial intention: Do female students benefit? *International Small Business Journal* 34(8): 979–1003.
- Wieland A, Kemmelmeir M and McKelvey B (2013) The gender congruence bias in entrepreneurship. *Academy of Management Proceedings*. DOI: 10.5465/AMBPP.2016.14183abstract.
- Wilson F, Kickul J and Marlino D (2007) Gender, entrepreneurial self-efficacy, and entrepreneurial career intentions: Implications for entrepreneurship education. *Entrepreneurship: Theory and Practice* 31(3): 387–406.
- Wilson F, Kickul J, Marlino D, et al. (2009) An analysis of the role of gender and self-efficacy in developing female entrepreneurial interest and behavior. *Journal of Developmental Entrepreneurship* 14(2): 105–119.
- Wilson F, Marlino D and Kickul J (2004) Our entrepreneurial future: Examining the diverse attitudes and motivations of teens across gender and ethnic identity. *Journal of Developmental Entrepreneurship* 9(3): 177–197.
- Zampetakis LA, Bakatsaki M, Kafetsios K, et al. (2016) Sex differences in entrepreneurs' business growth intentions: An identity approach. *Journal of Innovation and Entrepreneurship* 5: 29.
- Zhao H, Seibert SE and Hills GE (2005) The mediating role of self-efficacy in the development of entrepreneurial intentions. *Journal of Applied Psychology* 90(6): 1265–1272.

### Author biographies

Rachel S Shinnar is a Professor in the Department of Management at the Walker College of Business, Appalachian State University. She holds a PhD in Hospitality Administration from the University of Nevada Las Vegas. Her research interests include female and immigrant entrepreneurship, entrepreneurship education and social entrepreneurship.

Dan K Hsu is an Assistant Professor in the Department of Management at the Walker College of Business, Appalachian State University. He holds a PhD in Entrepreneurship from Syracuse University. His research interests include serial entrepreneurs, entrepreneurs' well-being, and the experimental method.

Benjamin C Powell is an Associate Professor in the Department of Management at the Walker College of Business, Appalachian State University. He holds a PhD in Management from the University of Pennsylvania. His current research interests are focused on entrepreneurial pedagogy, entrepreneurial careers, and the application of evolutionary theory to entrepreneurship.

Haibo Zhou is an Assistant Professor at the Dutch Institute for Knowledge Intensive Entrepreneurship (NIKOS), University of Twente. She holds a PhD in Economics of Entrepreneurship from Erasmus University Rotterdam. Her research interests include entrepreneurship well-being, entrepreneurial finance, innovation, family involvement, and firm growth and survival/exit.