

**The effect of training in starting a business on subsequent entrepreneurial awareness,
attitudes, intention and activity: a 37 nation study**

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Final accepted version for International Review of Entrepreneurship
11 November 2014

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Abstract. While entrepreneurship training is widely supported as a policy instrument, the impact of entrepreneurship training remains understudied. In this 37 nation study, we report the results of a novel multivariate analysis of the effect of training in starting a business. This study overcomes many methodological problems experienced by prior studies, including representativeness, selection bias, delay between treatment (training) and effect (awareness, attitudes, intention or activity), multiple sources of training over time, and national context. Results suggest that training is most effective in contexts with low TEA rates and a low proportion of trained individuals; other aspects of the environment for entrepreneurship do not show significant effects. Implications are drawn for educators and policy-makers in different national contexts.

Keywords: Entrepreneurship, training, evaluation, impact

1. Introduction

There is widespread and growing interest in promoting entrepreneurship around the world (World Economic Forum, 2009; 2014). Policy makers and commentators are increasingly acknowledging the job-creation potential of entrepreneurs, and societies view starting a business as providing incomes for families and a means for people to pursue opportunities that inspire them. It is even argued that entrepreneurship in today's environment is increasingly becoming a vital life skill (Gendron, 2004, p.302; World Economic Forum, 2009, p.20). Not surprisingly therefore, education and training in entrepreneurship is regarded as a key plank of entrepreneurship policy (European Commission, 2008). Unfortunately, there is very little empirical evidence that entrepreneurship education and training delivers the impact that is increasingly expected of it. This is partly because entrepreneurship can be interpreted broadly as a particular mindset or narrowly as engaging in a certain type of activity, such as starting a business (Reynolds and White, 1997). It is also because, as we show below, measuring impact is fraught with methodological difficulties.

The dividing line between entrepreneurship education and entrepreneurship training is also unclear. Entrepreneurship education programs have permeated higher education in many countries, and entrepreneurship education is considered a mature field at the tertiary education level in some countries, such as the US (Katz, 2008). But entrepreneurship curricula in universities can range from vocational classes on starting a business taught by adjuncts with little knowledge or interest in theory on the subject to academic "about entrepreneurship" classes taught by individuals who have never left the education sector and which have little practical relevance. Not surprisingly, the results of impact studies to date have been mixed (Martin, McNally and Kay, 2013).

Research on entrepreneurship education and training has often addressed the supply side of this topic. A content-analysis of 103 peer-reviewed entrepreneurship education articles revealed four major themes in entrepreneurship education: (1) the function of entrepreneurship education in society, (2) technical aspects in design and curriculum, (2), content and delivery, and (4) student needs (Bechard and Gregoire, 2005). Examples of this supply-side research include teacher and student evaluations of program effectiveness (Cheung, 2008; Hegarty, 2006; Ladzani and van Vuuren, 2002), national and regional reviews of the availability and nature of entrepreneurship education programmes (Levie, 1999; Autio, 2007) and assessments of the value of entrepreneurship education in general (Pittaway and Cope, 2007; Shinnar, Pruett, and Toney, 2008).

While these studies provide useful information on what education and training in entrepreneurship can or should offer, they do not tell us what trained individuals actually gain from their training (Bécharde and Grégoire, 2005). Further, while participants may report gaining knowledge about different competencies relevant to entrepreneurship and even greater confidence (Bauer, 2011), this does not tell us whether these will in fact influence their intentions or actions. Greater understanding is needed about whether these programmes do, in fact, influence the actions of people—beyond generally improving their skills or attitudes toward entrepreneurship (Garavan and O Cinneide, 1994a; Pittaway and Cope, 2007).

Additionally, government, nongovernment, and private institutions across the world offer vocational training programmes geared toward equipping current or would-be business owners with the skills they need to start and grow their ventures and these vary greatly in

type and quality. Rigorous evaluation studies on the impact of such programmes are rare, and it is often not clear whether those who are not entrepreneurs will actually start businesses as a result of these training programs (Klinger and Schundeln, 2011). This reveals a need for empirical work examining the connection to entrepreneurial actions.

Finally, each country has a different context for starting a business, with some providing more favourable environments than others and with each having particular challenges entrepreneurs need to address (Amoros and Bosma, 2014). Intuitively, training programmes should play a key role in helping would-be entrepreneurs deal with obstacles to starting businesses. Because of the importance of context, empirical work in this area requires multi-country studies, but the few rigorous studies to date on entrepreneurship training have focused on different single countries, been limited to study of short term effects of single programmes using quasi-experimental studies (e.g. Klinger and Schundeln, 2011) or randomised controlled trials (Field, Jayachandran and Pande, 2010; Glaub, Frese, Fisher and Hopper, 2014; Karlan and Valdivia, 2011). Not surprisingly, therefore, they have also produced conflicting results.

In this article, we narrow our focus from entrepreneurship education and training in general to ‘training in starting a business’, and we ask the following research questions. First, does training in starting a business increase awareness of entrepreneurs around them, increase entrepreneurial self-efficacy and recognition of new business opportunities, develop intentions to start a business, and actually lead one to launch a venture? Second, how does the national context influence the gain realized from training individuals in entrepreneurship? We examine this question through multivariate analyses of the effect of training on starting a business in 37 countries, based on a Global Entrepreneurship Monitor (GEM) special topic

survey on entrepreneurship education and training. This study overcomes many of the methodological problems experienced by prior studies, including representativeness, selection bias, delay between treatment (training) and effect (attitudes, intention or activity), and multiple sources of training over time. We do not address what types of training are more effective than others, leaving this for further research.

The results reveal that training is most effective in contexts with low TEA rates and a low proportion of trained individuals; other aspects of the environment for entrepreneurship do not show significant effects. We conclude that policy makers may consider entrepreneurship training to be an efficient mechanism for increasing entrepreneurial activity in countries where the existing level of trained individuals in the working age population is relatively low and/or where the current TEA rate is low. Where a high level of trained individuals already exists, or where TEA levels are already high, policymakers might wish to consider more focused training for particular areas of national need such as sector-specific or high potential start-ups rather than general programmes, as the latter may provide a disappointing return.

In the next section, we review the literature on prior studies of the effect of entrepreneurship education and training on subsequent entrepreneurial attitudes, intentions and activity, developing six hypotheses on the effect of national context on gain from training. We note methodological issues with prior studies and then outline our methodological approach, which is designed to address these issues. In the results section, we report the gain from training to attitudes, intention and behaviour in 37 different economies, and the hypothesis tests. Following a discussion of the results, we conclude with implications for governments, entrepreneurs and educators, note the limitations of our work and suggest avenues for future research.

2. Literature Review: The Effect of Entrepreneurship Education and Training on Subsequent Entrepreneurial Attitudes and Behaviour

In this paper, we use a process model of entrepreneurship in which awareness of entrepreneurs and attitudes to entrepreneurship may affect intention to start a business and, in turn, intention may affect actual start-up activity (Bosma, Acs, Autio, Coduras, and Levie 2009). While education and training are both used in this paper to describe the topic under study, acknowledgement should be made for the range of program types and audiences. A World Economic Forum (WEF) report (WEF, 2009) provided a comprehensive review of a range of entrepreneurship programs across the world, including government, NGO and multinational initiatives, and covering a range of education levels from primary schools to universities, as well as post-school initiatives. As Bechard and Gregoire (2005) point out, academics have been preoccupied with the extent entrepreneurship education has penetrated the university level and with the appropriate teaching practices for entrepreneurship in higher education. It is important to understand that entrepreneurs can receive training at different points in their lives and through school or non-school sources.

Researchers have suggested that education and training that is specific to entrepreneurship should positively influence actions by enhancing the skills required to start and grow a venture (Honig 2004; Summit Consulting, 2009). Entrepreneurship training, for example, can enhance one's cognitive ability for managing the complex process of opportunity recognition and assessment (DeTienne and Chandler 2004). Research studies have examined the link between these skills and entrepreneurship, often taking a human capital perspective, examining whether those with higher levels of education or experience will be more likely to

recognize opportunities or start businesses (Davidsson and Honig, 2003; Bhagavatula et al., 2010). There is little evidence, however, that connects the skills gained specifically through entrepreneurship education to the likelihood one will actually start a business (Edelman, Manolova, and Brush, 2008). Blackford, Sebora and Whitehill (2009) found an association between the number of entrepreneurship classes students took at a university and the likelihood they would actually start a business. But this may reflect interest in starting a business rather than the impact of the classes. Much more work is therefore needed to examine the direct link between entrepreneurship-specific education or training and entrepreneurial activity.

2.1 Awareness of entrepreneurs

Entrepreneurship education and training can provide examples of the entrepreneurship process, and role models individuals can identify with. This can show people what is possible, and equip them with the ability to recognize, assess and shape opportunities (Fiet, 2000). This can result in a variety of behaviours. For example, a study conducted for the U.S. Small Business Administration Office of Advocacy (Summit Consulting, 2009) found that university graduates that have taken entrepreneurship courses are more likely to select careers in entrepreneurship, develop patented inventions or innovative processes, services or products, and work in small businesses. Unfortunately, this study was unable to control for self-selection into these courses.

2.2 Attitudes and Intentions

Attitudes and intentions are important in boosting the chance individuals will attempt an entrepreneurial endeavour at some point in their lives (Souitaris et al., 2007). For instance, Munoz et al. (2011) found that entrepreneurship education led most students to enhance their mental frames for opportunity identification. They explained that these mental frames enable entrepreneurs to perceive their external environment differently and make new connections from stimuli they encounter.

Research on the influence of education and training on attitudes have found a positive link to interest in entrepreneurship, attitudes toward entrepreneurship, and perception of the feasibility of starting a business. Examples include post-secondary education in Northern Ireland (Hegarty, 2006), university students in England (Souitaris et al., 2007), Germany (Walter and Dohse, 2009) and the United States (Kher, Just and Streeter, 2011), and secondary school pupils enrolled in an entrepreneurship program in Australia (Peterman and Kennedy, 2003).

On the other hand, studies have found decreases in intention after entrepreneurship education programs, for example in a Dutch school (Oosterbeck et al., 2010) and a German university (Weber et al., 2009). Other studies show that entrepreneurship training programs can reduce intentions among those who have had prior exposure to entrepreneurship and prior intentions to start (e.g. Fayolle et al., 2006).

2.3 Activity

The specific link to business starts can be seen in some studies based on government training programs. Klinger and Schundeln (2011) in a quasi-experimental design examined the results of a survey of 377 participants in a business training program conducted by the NGO TechnoServe in Central America between 2002 and 2005, comparing the results with 278 people that did not receive the training. They found that the program was significantly linked to the probability of business starts or existing business expansion.

The “gold standard” for training interventions is the randomized controlled trial (Storey, 1999). Very few of these have been conducted for business start-up training. Field et al. (2010) found that training had a positive effect on business activity of low caste female Hindu micro-entrepreneurs but not on their Muslim peers. Karlan and Valdivia (2011) measured the marginal impact of adding business training to a Peruvian group lending program for female micro-entrepreneurs. They found little or no evidence of changes in key outcomes such as business revenue, profits, or employment. Glaub, Frese, Fisher and Hopper (2014) found that a 3 day training programme for small business owners in Uganda increased personal initiative behaviour and entrepreneurial success over a 12-month period after the intervention, but these owners were already in business for at least one year. Mano, Iddrisu and Yoshino (2011) obtained similar results with Ghanaian micro-entrepreneurs. Michaelides and Benus (2012) examined data from Project GATE in the U.S., finding that self-employment training led to a higher incidence of new business starts within 6 months of receiving this training for participants who were unemployed at the time. They also found that these participants were highly likely to remain self-employed five years after the training. However, they found no effect for employed participants. Fairlie and Holleran (2012),

drawing on the same data, found a positive training effect among those who were risk tolerant.

Gatewood (1993) sees potential negative effects of entrepreneurship training. Focusing on public sector venture assistance, she suggests that while these programs can improve the abilities and problem-solving approaches of potential founders, they can discourage entrepreneurs who are refused assistance. Moreover, those receiving training may not start their businesses because they may perceive they do not have the right skills or that they do not have a viable opportunity, thus preventing learning by doing.

These apparent contradictions in the literature may indicate that training can help ensure that those businesses actually started will be more successful. If high SME failure rates are a consequence of a lack of training, as Ibrahim and Soufani (2002) suggest, perhaps training can weed out inexperienced entrepreneurs or those with an unfeasible opportunity. This, however, places the burden on sound screening and training practices in the early stages, when uncertainty is highest. Even then, business ideas screened out of programmes may lead to missed opportunities because capable entrepreneurs may shape poor-quality opportunities into more viable ones. In addition, they gain experience that creates new learning and builds skills.

2.4 Environmental Variables

Education and training does not operate in isolation. Conditions in the environment may enhance the ease by which one can get started, or they can set down barriers that work to preclude this activity. For example, Murdock (2012) found that the level of business

regulation negatively impacted the entry rate of new firms in 19 EU countries. Several studies also examined start-up procedures and minimum capital requirements. Dreher and Gassebner (2013) found that a larger number of procedures and higher minimum capital requirements reduce entrepreneurship levels. Van Stel et al. (2007) drew on GEM and World Bank Doing Business data for 39 countries, also found that minimum capital requirements lowers entrepreneurship rates, but administrative aspects (time, cost, number of procedures) did not. Several authors, however, caution that the impact of environmental conditions may be stronger at the local, rather than national, level. Murdock (2012) indicates that the trend in public policy has been away from national level controls and toward local policy addressing local needs. Dennis (2011) emphasizes that policy changes may be easier to implement at the regional level, and there may be incentives at the regional level to gain visibility and nearer-term impact for the region. Sternberg (2012) also highlights the importance of local and regional (rather than national) policies for promoting entrepreneurship, adding that entrepreneurship capital is embedded in regions. He acknowledges, however, that national level inquiry may play a role in a multi-level policy focus—citing entrepreneurship education as an example.

These country-level studies provide mixed evidence about the relationships between entrepreneurship education and training and awareness, attitudes and intentions toward this activity. It is not clear from this literature whether people on average experience a gain from training in terms of, not only their awareness and attitudes towards entrepreneurship and their intentions to get started, but also the actions taken to get a business started. Furthermore, little is known about whether results from a single national context are more broadly applicable with regard to the link between training and particular outcomes. A number of methodological issues also exist in this research, as the next section details.

2.5 Methodological issues in conducting research on the effect of entrepreneurship training

Many research studies on entrepreneurship training have had difficulty assembling adequate control groups to demonstrate effects, due to cost and data protection issues (Summit Consulting, 2009), or have other built-in methodological weaknesses (Martin et al., 2013). Ideally, one would conduct research of this type on random samples of the entire working age population in a wide range of countries. By asking random samples of the population questions about their entrepreneurial awareness, attitudes, intention and activity, and then, later in the interview, asking them questions about any training in starting a business they may have had, many sampling biases could be avoided and natural control groups would be created.

By measuring demographic characteristics of each individual sampled, one could control for age group, gender, education, working status and other effects that might mask the training effect. This has been done in several previous studies that attempt to measure the marginal effect of specific training programs (e.g. Charney and Libecap, 2000). However, several methodological issues remain with these studies, which we outline below.

It is natural to assume that those who want to start businesses would seek out information on how to do this. They might therefore seek training as part of this search. If one were to compare these people with those who did not take training, observed differences in awareness, attitudes, intention or activity might not just be due to their training, but also their prior orientation. For example, business school students tend to self-select into this type of education and, most often, into entrepreneurship training once they are at business school. Studies that compare graduates of entrepreneurship programs within business schools to their

other business school peers are likely to suffer from this selection bias, even if other characteristics such as demographics or business experience are controlled for (Safranski, 2004). A solution to this self-selection bias would be to ask individuals in a random sample whether their training was voluntary or compulsory, or both. Then, one could remove those who had voluntary training from analyses of cause and effect, eliminating self-selection bias to a considerable degree.

People may receive entrepreneurship education and training at various times in their lives, such as at school, university, or beyond their formal education. In addition, the effects may be deferred rather than instantaneous. For example, in the short term, graduates of entrepreneurship education may recognize the need to amass specific knowledge (Fiet and Pankaj, 2008) and decide to defer action until they understand their chosen industry better. An ideal research design would allow for multiple sources of training and deferred effects.

An ideal research design would also account for differences in how individuals learn. This learning can range from traditional education to self-directed learning to experiential immersion in the phenomenon, for example, through a placement or internship in an actual company. One would have to survey individuals about the full range of possible training sources, from primary school onwards.

By noting all the training in starting a business a representative sample of individuals have received in their lives so far, and analysing a broad array of outcomes, one could address the issues of multiple types and timing of training that have hampered progress in research on the effect of entrepreneurship education and training.

By surveying many countries, one could test for the effect of hypothesized contextual differences on training outcomes.

2.6 Hypotheses

Intuitively, one would expect that the general environment for start-ups should affect the gain in activity from training more than the gain in awareness, attitudes or intention. Conditions that make it harder to start a business, such as lack of customers with disposable income, lack of availability of finance, onerous regulations, and poor infrastructure can be expected to reduce the gain in entrepreneurial activity from training, and possibly even generate negative gains from training as individuals are made aware of the difficulties involved in starting a business in economies with poor environments for entrepreneurship. However, individuals may still develop greater awareness of entrepreneurs, more favourable attitudes and a desire to start a business as a result of training, despite the environment. This leads to our first two hypotheses:

H1: The environment for starting a business in an economy has no effect on gain in entrepreneurial attitudes or intention from training in starting a business.

H2: The more conducive the environment for starting a business in an economy, the higher the gain in entrepreneurial activity from training in starting a business.

The gain from training in activity may also be affected by perceived competition from other trained individuals. Increasing the stock of trained individuals may generate diminishing returns in activity, as individuals compete for a limited set of opportunities in an economy. Thus the relationship between gain from training and the proportion of trained individuals

may be curvilinear and negative: increasing the stock of trained individuals may drop the marginal gain from training gradually to zero, but not beyond. However, this competitive effect is less likely to affect awareness, attitudes or intentions. Thus, we hypothesise:

H3: The stock of individuals in an economy who have received training in starting a business has no effect on gain in entrepreneurial awareness, attitudes or intention from training.

H4: There is a negative, curvilinear relationship between the stock of individuals in an economy who have received training in starting a business and the gain in entrepreneurial activity from training.

In some countries, entrepreneurship is widespread, easily observable, and culturally acceptable. In others, few individuals start businesses; any training that exists in these countries may provide a more significant source of learning. We would expect, therefore, that the expected positive effect of training on awareness, attitudes, intention and activity, for example, would be lower in countries with higher levels of awareness, attitudes, intention or activity, because positive norms and role models already act as “passive trainers” in these countries. However, we would not expect the gain from training to be negative in highly entrepreneurial economies: the relationship is likely to be curvilinear, with the gain from training approaching but not going beyond zero in highly entrepreneurial economies. Thus, we hypothesise:

H5: There is a negative, curvilinear relationship between the level of entrepreneurial awareness, attitudes, and intention in an economy and the gain in entrepreneurial awareness, attitudes, and intention from training in starting a business.

H6: There is a negative, curvilinear relationship between the level of entrepreneurial activity in an economy and the gain in entrepreneurial activity from training in starting a business.

3. Method

Led by a central coordination team, the Global Entrepreneurship Monitor (GEM) consortium administers an annual adult population survey (APS) of at least 2,000 individuals aged between 18 and 64 in each participating country. Each country participating in the GEM project has a national academic team, which selects a local survey vendor to conduct the APS and then monitors the process for quality control. The GEM central coordination team and its specialized staff ensure that each team follows strict GEM research standards. This ensures data quality and allows for the harmonization of data across all participating countries. All teams and vendors therefore adopt the same methodology. Further details of the methodology are provided in Bosma and Levie (2010), Levie and Autio (2008), and Reynolds et al. (2005), and online at www.gemconsortium.org.

GEM expert surveys in most countries suggest that entrepreneurship education and training, both in school and outside of school, is inadequate (Bosma et al., 2009). Recognizing this concern among hundreds of experts across the globe, the GEM consortium chose education and training as its special topic for 2008. Of the 43 countries participating in the 2008 survey, 38 added questions about training in starting a business to their adult population surveys and 37 of these provided sufficient demographic information on individuals for analysis of the effect of this training on entrepreneurial awareness, attitudes, intentions, and activity.

The awareness, attitude and intention variables were measured using single item, yes/no response items to standardized statements. This choice represented a compromise between cost and robustness, and between survey completion rates and survey length. Use of factors drawn from multiple items using Likert scales might have established validity and reliability and more nuanced data, but at a cost of lower survey completion rates while fewer questions could be asked using this alternative method. The awareness variable (*knowent*) was measured using response to the item: “*You know personally someone who has started their own business in the last two years*”. Three attitude variables were measured using the following items: (*opport*) “*There will be good opportunities for starting a business in the area where you live in the next six months*”; (*suskil*) “*You have the knowledge, skills and experience to start a business*”; (*fearfail*) “*You would not start a business in case it might fail*”. The activity variable is based on an index of early-stage entrepreneurial activity (*TEA*), that measures whether someone is actively trying to start a business, either for themselves or their employer, or is currently managing a business that has been paying wages for more than 3 months but less than 3½ years and in which the individual is an owner or part-owner. The TEA index is calculated using on a complex set of filter variables that are unique to the GEM project and explained in detail in the citations provided above.

The 2008 APS survey asked respondents if they had ever taken part in training in starting a business in school (“school-based training”) or outside of school (“non-school-based training”). For non-school training, survey interviewers asked respondents to identify the main provider of the program. These included a college or university, a local business association, public agency, an employer, and self-study. Whether individuals took training on-line was also recorded. The survey also asked respondents if they took this training voluntarily or if it was compulsory (for example, a required part of a school or government

program). This distinction enables the identification of outcomes that could not be due to self-selection. In other words, it permits a more accurate measurement of the “gain from training”, or increased odds of engaging in entrepreneurial behaviour that is due to the training itself rather than a consequence of some prior desire to behave entrepreneurially. Thus our independent variable was *training status*: no training, compulsory training from any source, or voluntary training from any source. This represents a catch-all, summary measure. We found that in some countries, training from some sources was very rare. To conduct a comparative analysis across as many countries as possible, we therefore opted for this catch-all measure for this study.

Four individual level controls were included in the analysis: *gender*, *age group*, *education level* and *working status*. These are harmonized cross-national measures used by the GEM research consortium and they have all been shown in prior studies to affect propensity to engage in the entrepreneurial process (see e.g. Amorós and Bosma, 2014; Bosma et al., 2009).

3.1 Dependent Variable: Gain from Training

The core measure of effect we used to test our hypotheses is “gain from training.” In order to address the self-selection problem, we compared the effect of having had compulsory training versus not having had any training on entrepreneurial awareness, attitudes (such as skills or opportunity perception or fear of failure), intention to start a business and early-stage entrepreneurial activity, controlling for the demographic background of an individual. Large random samples of the working age population in each country provided natural controls.

Gain to training was calculated using an advanced statistical technique called binary logistic regression. This enabled calculation of the “odds ratio” or the odds of an individual having a particular characteristic if they received compulsory training (e.g. 2 in 3) versus the odds of someone having the same characteristic if they had no training (e.g. 1 in 3), while controlling for other possible effects such as the demographics mentioned above. In the above example, the odds ratio would be 2 (2/3 divided by 1/3). A further advantage of using this technique is that it estimates whether the effect of training is statistically significant, or a possible artifact of random fluctuations in the data.

Gain from training is a country-based measure that can be interpreted at an individual or group level. First, it can be thought of as the increase in the odds that an individual with a given set of demographic characteristics will have a particular entrepreneurial orientation if they had ever taken compulsory training (but not voluntary training) versus an individual with identical demographic characteristics but with no such training, as in the example given above. In the above example, trained individuals experienced a gain in training of two; their odds of having a particular orientation (say: 1 in 3) are doubled (to, say, 2 in 3) if they have taken compulsory training instead of no training at all.

Second, it can be thought of as the increase in the proportion of people in the country who have a characteristic, such as a particular attitude, because of compulsory training (but not voluntary training) in starting a business, controlling for demographic differences (age group, gender, education, working status). Thus, a gain of two would mean that if we were to take two samples of people, differing only in that one group had just compulsory training in starting a business and the other did not, we would find that twice as many people in the compulsory training group have this attitude compared to people in the other group.

Gain from training was calculated by performing binary logistic regressions for each country sample, where the independent variable was individual propensity to have or have not entrepreneurial awareness, attitude, intention or activity using the measures described above. In all, 222 logistic regressions were performed (6 for each of 37 economies). All logistic regressions were checked for model fit using the Hosmer Lemeshow test and for overall significance. Less than 5% of regressions had poor model fit, suggesting important variables were missing from the model for these countries and dependent variables. These were: Bosnia and Herzegovina (*TEA*); South Africa (*knowent*); Turkey (*futsup*, *skills*); Latvia (*opport*); Jamaica (*knowent*); Greece (*knowent*, *futsup*, *fearfail*); Spain (*skills*) and Japan (*skills*). The exponent of the B coefficient (log odds) for the variable *training status* estimates the independent effect of training on the dependent variable, controlling for gender, age, education and working status. This is our core measure of “gain from training”.

3.2 Measuring contextual effects on gain from training

To test H1 to H6, linear regression was employed, with gain from training (for each nation) as the dependent variable.

A wide range of national-level measures of the environment for entrepreneurship which have been theorized to influence entrepreneurial activity was employed (Levie and Autio, 2008). Demand-based measures included the size of the overall market (population) and the wealth of the economy (GDP per capita). Population data were taken from U.S. Bureau of the Census International Database (IDB), available at www.census.gov/ipc/www/idbprint.html. Gross Domestic Product (GDP) per 10,000 people was based on purchasing-power-parity

(PPP), valued in current international dollars; these data were obtained from the IMF's World Economic Outlook Database, downloaded from www.imf.org/external/ns/cs.aspx?id=28.

Measures of business start-up regulations were taken from the 2009 Doing Business report published by the World Bank, which reported four different measures of regulation-imposed difficulty in starting a business as of June 2008. To ensure comparability across countries, the measures are calculated for a 'standardised' company (Djankov et al., 2002) which is larger than usual and not representative of business start-ups. This could affect the results and should be noted. While the World Bank ranks countries by combining all four measures, factor analysis for the 37 countries suggested that the four indicators were not linked to an underlying construct, and each measure was entered into separate regressions.

Finally, the GEM National Expert Survey (NES) provided a set of 22 different ratings on the environment for new and growing firms from responses of at least 36 experts in entrepreneurship in each country based factor-analysing 90 statements that experts responded to on a five point Likert scale. These were estimated in 27 of the 37 countries.

The current stock of individuals trained in starting a business was taken as the percentage of individuals aged 18 to 64 who had ever participated in any form of training in starting a business. This was taken from the GEM 2008 APS. Current entrepreneurial awareness, attitude, intention and activity rates were also taken from the GEM 2008 APS.

4. Results

Table 1 reports the wealth per capita in each participating country, the total percentage of working age individuals who have received any training in starting a business, the TEA rate in 2008 and the gain to training in TEA rates for each country. Table 2 displays country estimates of gain from training in starting a business for our measures of awareness (*knowent*), attitudes (*opport*, *suskil*, *fearfail*) and intention (*futsup*), and the gains to training for each of these measures. We report the gain from training and level of significance of the training variable: none ($p \geq .1$), low ($p < 0.1$), moderate ($p < .05$), high ($p < .01$).

The results show that the stock of individuals who have been trained in starting a business varies widely, even among countries with broadly similar levels of economic development and in similar geographic locations. Because compulsory training is relatively rare in many countries, it is possible that non-significant but large gains are due to the small size of the sample.

Table 3 shows the correlation matrix for the final independent variables used in a set of linear regression models, displayed in Table 4, in which gain in early-stage entrepreneurial activity (TEA) from training is the dependent variable. We have only 36 data points, after removing France which analysis suggested behaved as an outlier. Because of the lack of degrees of freedom, and the consequent danger of over-fitting the data, hypothesized curvilinear relationships are tested by taking the natural log of the TEA rate and the percentage of trained individuals, instead of employing a polynomial (which would require at least two separate variables). The effect of these two transformed variables is greater (and with the expected

sign) than the untransformed variables, supporting the expectation of a curvilinear relationship and supporting H4 and H6.

Neither GDP per capita nor any of the other environmental measures we tried (most of which correlated highly with GDP per capita) were significantly related to gain in TEA from training, except when entered with percentage of trained individuals alone (model 2 in Table 4), an effect that disappeared when lnTEA was entered into the model (model3). Thus H2 is not supported.

Despite the moderate negative correlation between GDP per capita and lnTEA, the effect of lnTEA is strong and significant, and the condition index, tolerance and VIF levels all suggest that multi-collinearity is not an issue in the final model.

The final model explains 43% of the variance in gain in TEA from training. None of the models that attempted to explain awareness, attitudes or intention were significant; thus H1 is not disproved and H3 and H5 are not supported. For space reasons, these non-significant results are not reported here, but are available from the authors on request.

5. Discussion

A number of trends are evident in our results. Surprisingly, the general environment for entrepreneurship does not appear to significantly affect gain in early-stage entrepreneurial activity rates from training. We consider the implications of this for policy in the next section. The apparent increase in frequency of significant gains from training with increasing levels of economic development, seen in Tables 1 and 2, may be misleading. As Table 4

shows, it is the background level of TEA and the stock of trained individuals that seem to make a difference rather than the environment for entrepreneurship, with higher levels of TEA and trained individuals having increasingly depressive effects on the gain from training. These two variables, in their natural log-transformed variants, together explain over 40% of the variance in gain from training. This helps explain why a country like Finland, which has a relatively conducive environment for entrepreneurship and a very high proportion of trained individuals, does not see the gain from training that one might expect, and why less wealthy countries with low levels of trained individuals and/or TEA rates such as Serbia, Romania, South Africa and Uruguay show significant gains while many others with higher rates of trained individuals or TEA rates do not.

Awareness of entrepreneurs seems to have been significantly raised by training in the majority (57%) of the countries in our sample. On average, training appears to triple the level of skills perception in most (73%) countries, although in some poorer countries small proportions of compulsory training may have resulted in lack of significance on this measure. By contrast, opportunity perception is enhanced significantly in relatively few (19%) of the countries. Training did not seem to affect fear of failure, except in Hungary, Slovenia and Greece, where fear of failure decreased by between 60 and 80% among those who had taken compulsory training. Finally, intention rates were raised significantly in the majority (59%) of countries.

Overall, we see a reduction in the number of countries in which training has a significant effect with measures of increasing engagement in the process of entrepreneurial activity, from skills self-perception (73% of countries) to intention (59%) to activity (57%). As we have seen, two important factors that impede training have a “hard” effect on activity as

opposed to a “soft” effect on attitudes are the background rate of TEA, which is usually but not always higher in poorer countries, and the percentage of individuals who have already been trained.

The lack of effect of training on opportunity perception, when compared with its effect on skills perception, is notable, particularly as these two variables are moderately highly correlated with each other at the national level ($r = .679$, $p=.000$, $n=37$). It suggests that training in opportunity perception is not as advanced as other aspects of training in starting a business.

6. Conclusions, Limitations and Recommendations

To our knowledge, this is the first study to take national context into account in assessing the impact of training in starting a business on the propensity of individuals to be aware of start-up entrepreneurs, have favourable attitudes to starting a business, intend to start a business, and be actively engaged in starting a business. We find not just that the frequency of trained individuals in the working age population varies widely between countries, but that the effect of training varies by context. Training is most effective in economies with low rates of start-up activity and a low stock of trained individuals. Surprisingly, other contextual factors such as wealth per capita, regulation of start-ups and other measures of the environment for entrepreneurship had no significant effect.

The GEM data on which this paper is based have several limitations. These include the following:

- The surveyed population spans a broad age range: from 18 to 64 years. The extent of training in a country may be a function of its age profile, and population level comparisons need to take consider this. The analyses of impact controlled for age group. Further analyses could estimate if the average age of the working age population in a country might affect gain from training.
- The sources of training for each respondent are not a guide to the type or the quality of training received by individual respondents. It is possible that some countries may sacrifice quality for quantity of training, for example, and that this may cause the negative association between the percentage of trained individuals and gain from training.
- The countries in our sample are not necessarily representative of the population of countries in the world. In particular, we had relatively few very poor countries. We might have found a relationship between wealth per capita and gain from training had our sample been a random one.

The finding that the general environment for entrepreneurship does not appear to significantly affect gain in early-stage entrepreneurial activity rates from training has some positive implications for policy makers. Even if the environment is rather hostile to entrepreneurship, a gain in training is possible, *ceteris paribus*. Policy makers may consider entrepreneurship training to be an efficient mechanism for increasing entrepreneurial activity in countries where the existing level of trained individuals in the working age population is relatively low and/or where the current TEA rate is low. Where a high level of trained individuals already exists, or where TEA levels are already high, policymakers might wish to consider more focused training for particular areas of national need such as sector-specific or high potential start-ups rather than general programmes, as the latter may provide a disappointing return. An

example here might be Finland, which has the highest rate of training in starting a business in our sample and which showed no gain in activity from training. In contrast to our general findings, a careful impact study of a high growth start-up programme in Finland suggested a positive effect of training (Autio and Rannikko, 2014).

While we found that training in starting a business greatly increased awareness of entrepreneurs and self-efficacy (relevant skills self-perception), it is notable that it had no significant effect on opportunity perception. It may be assumed that skills perceptions are internal assessments while opportunity perceptions relate to the environment; training may increase how people see their own abilities but not how they view their environment. At the same time, training could serve to enhance people's awareness or abilities to recognize opportunities around them. Since opportunity perception is a core element of entrepreneurship (Shane and Venkataraman, 2000), this finding should be a source of concern for entrepreneurship educators and trainers and for policymakers. It suggests that there is a gap in the quality of training or in the training curriculum in this area, despite promising pedagogical developments on this topic (e.g. Fiet, 2000). Alleviating fear of failure should be another area of concern. This was lowered significantly by training in only a few countries.

Our analysis only identified possible reasons for around 40% of the variance in gain from training across countries in our sample. Most of the variance remains unexplained. While some of this may be due to measurement error or "noise", our dependent variable did not distinguish between quality, types or sources of training. Further research could examine the quality of training, whether sources of training make a difference (for example, whether training in school has the same or different effect to training outside school), and the types of training used (for example, learning theory versus action learning, rote versus experiential

learning and instructor-centred versus student-centred learning (see e.g. Hewitt, 2011; Jones and English, 2004; Jones-Evans, Williams and Deacon, 2000; Rasmussen and Sørheim, 2005). It could also assess if recent training has more effect than training received a long time ago. A study that combined all these factors might be able to uncover whether the quality of training has improved, an issue that is clearly a concern of policymakers (e.g. OECD/European Commission, 2012). Other factors that could affect gain from training include individual demographics such as ethnicity or religion (see e.g. Field et al., 2010).

Acknowledgement

Data for this study were provided by the Global Entrepreneurship Research Association. Names of the members of national teams, the global coordination team, and the financial sponsors are published in the Global Entrepreneurship Monitor 2008 Global Report, which can be downloaded at www.gemconsortium.org. The authors thank all the researchers and their financial supporters who made this research possible. Whilst this work is based on data collected by the GEM consortium, responsibility for analysis and interpretation of those data is the sole responsibility of the authors. The authors would also like to thank the editor, Andrew Burke, and two anonymous reviewers.

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Table 1 Percentage of working age population who have received training in starting a business, TEA rate and gain in TEA from training for 37 countries in 2008, by country, in order of increasing GDP per capita

Country	GDP(ppp) per capita	% trained individuals	TEA rate	Gain in TEA from training
India	0.288	13.4	11.49	1.3
Bolivia	0.470	19.1	29.82	1.2
Egypt	0.542	7.6	13.11	1.6
Bosnia and	0.663	20.0	9.02	2.5*
Ecuador	0.752	27.2	17.18	1.0
Jamaica	0.759	21.0	15.63	0.8
Serbia	0.795	10.2	7.59	2.1**
Dominican	0.801	7.7	20.35	1.6
Peru	0.843	29.6	25.57	1.3
Colombia	0.894	40.1	24.52	1.5
Macedonia	0.910	19.1	14.47	1.3
Brazil	1.030	9.4	12.02	2.1**
South Africa	1.133	13.9	7.76	2.6***
Uruguay	1.169	24.1	11.9	1.7**
Romania	1.227	8.7	3.98	3.3*
Iran	1.240	29.1	9.18	0.8
Turkey	1.304	6.3	5.96	3.3***
Mexico	1.410	16.2	13.09	1.5*
Chile	1.500	42.6	12.97	1.5
Croatia	1.627	28.1	7.59	1.7*
Latvia	1.800	28.3	6.53	1.2
Hungary	2.008	24.5	6.61	1.5**
Korea	2.644	13.6	9.99	1.3
Slovenia	2.896	35.8	6.4	1.4
Israel	3.091	12.8	6.45	3.0***
Italy	3.132	16.5	4.62	2.3**
Greece	3.194	17.0	9.86	1.8**
France	3.316	18.1	5.64	4.3***
Spain	3.458	22.0	7.03	1.1
Japan	3.461	17.4	5.42	2.1*
Germany	3.544	21.1	3.77	2.8***
United	3.662	18.4	5.91	2.4***
Finland	3.702	48.6	7.34	1.5
Belgium	3.748	33.6	2.85	2.6***
Denmark	3.821	22.6	4.44	1.2
Iceland	4.123	26.8	10.05	2.3***
Ireland	4.537	26.1	7.59	1.9**
Mean	2.040	21.5	10.37	1.9
S.D.	1.293	10.0	6.32	0.8

Key to statistical significance levels: * low ($p < .1$); ** medium ($p < .05$); *** high ($p < .01$)

Source: GEM Adult Population Survey 2008, World Bank, US Bureau of the Census

Table 2 GEM measures of entrepreneurial awareness, attitudes and intention rates and Gain from training (GFT) in awareness, attitudes and intention, 2008, for 37 countries

	Knownt	Opport	Suskil	Fearfail	Futsup	GFTKnownt	GFTOpport	GFTSuskil	GFTFearfail	GFTFutsup
India	60.50	58.47	57.97	44.17	32.69	1.8**	1.6*	2.3***	0.7	1.6***
Bolivia	46.19	54.02	76.16	40.53	42.68	1.5	1.0	0.9	1.3	1.9**
Egypt	43.79	34.87	59.22	29.42	40.37	1.4	1.2	2.4*	0.9	2.1**
Bosnia and Herzegovina	42.54	45.59	68.38	27.53	32.15	3.1*	2.3	7.9*	1.0	4.1***
Ecuador	38.30	41.31	70.29	34.91	42.47	1.4	1.4	1.7	0.8	1.9**
Jamaica	50.08	51.09	69.14	29.77	21.52	1.0	0.9	1.1	0.8	1.2
Serbia	54.02	51.22	64.24	28.45	33.65	1.9**	1.2	4.2***	0.8	1.3
Dominican Republic	59.29	55.62	76.52	28.38	37.21	1.9	1.0	0.8	0.6	2.1*
Peru	56.12	56.67	72.85	33.76	40.36	2.0***	1.4	1.4	1.2	1.2
Colombia	41.22	61.28	66.18	34.32	66.85	1.7	0.6	1.6	0.9	1.3
Macedonia	51.40	46.74	62.20	35.23	45.80	2.2**	0.8	2.7**	0.8	1.6
Brazil	47.89	41.44	53.12	47.09	24.96	1.5	1.8*	2.0*	0.6	1.5
South	44.86	37.23	37.03	30.55	16.88	2.8***	1.6*	4.9***	0.7	2.6***
Uruguay	45.13	51.00	63.35	35.9	23.13	1.5	1.3	3.6***	0.7	1.3
Romania	37.88	25.75	23.77	41.48	11.49	3.2***	1.2	4.5***	1.5	5.0***
Iran	46.28	33.72	61.28	23.15	37.45	0.8	0.9	1.8***	1.1	1.4***
Turkey	31.10	36.19	48.77	34.79	23.83	1.0	2.0*	4.1***	0.4*	1.9**
Mexico	52.69	47.35	59.29	29.55	30.44	2.1***	1.3	1.4	1.3	1.5**
Chile	45.51	27.61	62.60	36.66	38.17	1.2	1.4	3.3***	1.0	0.9
Croatia	52.20	44.38	59.80	38.16	12.15	1.8***	1.1	2.8***	0.9	1.2
Latvia	35.52	21.92	29.06	35.97	9.87	1.6**	1.1	3.5***	1.0	3.2***
Hungary	29.92	18.90	48.10	42.14	6.57	1.8***	1.9***	3.1***	0.6**	2.5***
Korea Republic	37.77	14.76	30.08	33.26	22.42	1.9**	2.2**	1.9**	0.8	1.4*
Slovenia	53.60	44.75	50.80	31.40	10.11	1.4**	1.6***	2.4***	0.7**	1.7***
Israel	37.83	27.35	40.86	42.23	18.22	2.1**	4.2***	4.6***	0.6*	3.2***
Italy	32.00	29.66	40.05	49.41	9.16	1.0	1.2	2.5***	1.0	1.2
Greece	39.15	28.11	55.30	56.96	16.64	1.7**	2.0**	1.8**	0.5***	1.0
France	32.94	21.59	24.66	50.37	15.17	1.5	1.3	3.1***	0.7	3.2***
Spain	37.60	25.40	46.51	51.79	7.69	1.3***	1.2***	1.5***	0.9	1.3***
Japan	23.24	7.64	12.54	40.62	7.95	4.2***	3.4***	2.3**	1.3	1.2
Germany	31.12	23.91	35.14	48.65	6.23	3.7***	1.2	2.5***	0.9	3.1***
United Kingdom	25.95	30.18	49.91	36.44	7.07	2.0***	1.4*	2.2***	0.9	2.5***
Finland	50.43	50.18	39.07	30.43	7.87	1.6***	1.0	3.4***	1.0	1.8**
Belgium	29.48	14.10	36.26	25.85	7.79	2.7***	1.7*	5.3***	0.9	2.4***
Denmark	44.02	62.15	32.17	42.88	7.40	1.2	1.2	2.4***	0.8*	1.3
Iceland	64.45	36.67	51.81	35.29	17.16	1.7**	1.3	4.5***	0.5*	1.9***
Ireland	37.23	26.55	47.80	37.76	9.96	1.2	0.9	2.6***	1.2	1.9**
Mean	42.95	37.44	50.87	37.17	22.74	1.8	1.5	2.8	0.9	2.0
S.D.	10.04	14.42	16.02	7.92	14.83	0.8	0.7	1.4	0.3	0.9

Key to statistical significance levels: * low (p<.1); ** medium (p<.05); *** high (p<.01)

Source: GEM Adult Population Survey 2008

Table 3 Correlation matrix for variables employed in linear regression

	Gain in tea from training	GDP (ppp) per capita	TEA08	% trained individuals	ln(TEA08)	ln(% trained individuals)
Gain in tea from training	1.000					
GDP (ppp) per capita	.234	1.000				
TEA08	-.482**	-.590**	1.000			
% trained individuals	-.379*	.270	.086	1.000		
ln(TEA08)	-.557**	-.634**	.948**	.051	1.000	
ln(% trained individuals)	-.433**	.319	.069	.958**	.033	1.000

N=36 (France, identified as an outlier, is excluded).

Pearson correlation coefficients (two-tailed)

Key to statistical significance levels: * medium ($p < .05$); ** high ($p < .01$)

Table 4 Linear regression coefficients and standard errors for linear regression of GDP per capita, and percentage of trained individuals and TEA rate on Gain from training across 36 countries, 2008

Independent Variables	Model 1	Model 2	Model 3
GDP (ppp) per capita	.121 (.087)	.215 (.077) ***	.024 (.095)
ln(% trained individuals)		-.749 (.198) ***	-.570 (.188) ***
Ln(TEA)			-.622 (.210) ***
Adjusted R-square	.027	.301	.434
Delta R-square	.055	.286	.141
F	1.967	8.544	9.950
Sig	.170	.001	.000

Unstandardized Beta coefficients and standard errors

Key to statistical significance levels: * medium ($p < .05$); ** high ($p < .01$)

N=36 (France was identified as an outlier and excluded)