**1. INTRODUCTION**

Despite a significant increase in women’s higher education attainment and labor-market participation over the past several decades (Petrongolo & Ronchi, 2020; Goldin 2006), women are still significantly less likely than men to become entrepreneurs. While recent government policies aimed at boosting participation rates of women entrepreneurs have been implemented with some success (Bullough et al., 2019), women remain underrepresented in the entrepreneurial arena (Langowitz & Minniti, 2007), especially in high-growth sectors (Brush et al., 2014; Marlow & McAdam, 2011; Morris et al., 2006; Robb et al., 2014).

In Israel, our focal entrepreneurial ecosystem, there were only 1,957 women (7.4%) out of 26,541 startup founders between 1997 and 2018 (IVC Online Report, 2019). Only 6.9% of the companies’ CEOs were women, and only 5.7% of the financing deals involved startups led by a women CEO (IVC Online Report, 2018). These numbers lag far behind the 40% representation of women in the local labor market, 29% in the local high-tech industry, 23% in R&D positions and 19% in R&D management positions in the local high-tech industry (SCI, 2021; SNC, 2021).

This low proportion is especially striking considering cumulative findings that gender does not correlate with firm performance (Dezsö & Ross, 2012; Du Rietz & Henrekson, 2000; Jennings & Brush, 2013; Lee & Marvel, 2014; Poggesi et al., 2016; Robb & Watson, 2012; Scott & Shu, 2017; Yousafzai et al., 2018; Zolin er al., 2013). As such, it is important to target and remove those gender-related conditions that hinder women entrepreneurship.

Understanding the causes for the low participation rate of women and identifying possible means to address these causes is a matter of both scholarly interest and public importance. Identifying the challenges to female entrepreneurship, and the possible means to overcome them, can help various stakeholders, such as educators, policy makers, and program leaders better align the support they provide to the specific needs of women, thereby more effectively increasing women’s participation in entrepreneurship. A review the literature reveals various obstacles to women entrepreneurship that can be classified into five main categories: a) low rates of entrepreneurial human capital (EHC); b) low-quality business networks; c) low levels of entrepreneurial self-efficacy (ESE) and self-confidence (ESC); d) discrimination, stereotypes and legitimacy issues in the entrepreneurial ecosystem; and, e) limited access to finance.

We propose that new entrepreneurial support systems, such as startup accelerators, can play an important role in decreasing the gender gap in entrepreneurship. Specifically, the organizational design of such support systems can address the aforementioned five obstacles that women meet, and, thus, they might attract more women founders. Accelerators’ role in this context can be pivotal, as they are fast becoming increasingly important actors in the innovative entrepreneurial ecosystem. Approximately one-third of first time founded startups in the United States are accelerator-backed startups (Chen, 2019), and about 20% of startups founded in Israel during the period 2011 through 2019 were backed by accelerators (based on our analysis of IVC data 2020).

This current study grew out of our initial finding that the participation rates of women founders within startup accelerators in Israel are significantly higher than their participation rates in the general innovative startup population. This finding was based on a macro-level dataset of 71 startup accelerators active between 2011 and 2019 in Israel. This dataset covers the majority of accelerator startup graduates in Israel active in Israel at that time. According to this data, the average rate of women founders in Israeli accelerators (15.3%) is more than double that in the general population of innovative startup founders (7.4%). This substantial difference motivated us to examine the design of accelerators through the lens of the specific needs of women entrepreneurs. We sought to identify the mechanisms through which accelerators help women entrepreneurs in the Israeli high-tech sector, considering the possibility that accelerators might be especially attractive for women since they cater to their specific needs. In particular, we suggest that this increased participation rate can be attributed to specific characteristics of startup accelerator resources, processes, and design that address the particular disadvantages of women entrepreneurs. To systematically examine the role of startup accelerators in female entrepreneurship, this study seeks to: describe the five main obstacles and resulting needs of women entrepreneurs; present the main design characteristics of accelerators, identifying which specific elements meet women entrepreneurs’ specific needs and how; and empirically test our assumptions.

This study contributes to the literature in several respects. First, it brings together and reviews the various barriers to women entrepreneurs, providing a comprehensive and concise overview of the challenges they face. In describing these barriers, we adopt Tatli et al.’s (2014) suggestion to consider relationality in the study of entrepreneurship, place the barriers in their broad social context, and highlight interrelations between them. Second, by linking the elements of accelerators’ design to the specific needs of women founders, it presents evidence that accelerators might be a significant tool for enhancing women’s participation as founders of innovative high growth startups, thereby contributing some generalized policy implications to the field of women entrepreneurship. Third, we built and used a unique and rich dataset documenting the goals, experiences, and outcomes of 779 accelerator graduates in the Israeli high-tech sector over the 2011–2019 period. Fourth, we provide evidence of the impact accelerators have on founders and on startup progress, which is seen in the direct and immediate results of the program, rather than in long-term outcomes. While this is not the core of the study, it does enrich the emerging literature on startup accelerator.

**2. LITERATURE REVIEW AND RESEARCH HYPOTHESES**

Before describing the five main barriers to women entrepreneurship, it should be emphasized that we are in no way suggesting that the disadvantages women face as entrepreneurs are due to gender per se. On the contrary, we cite evidence that gender in itself does not account for entrepreneurial success or firm performance. Consequently, we posit that due to social factors that are beyond the scope of this paper, such as discrimination, educational, and occupational gender role socialization or stereotypes (Eccles, 1994; Eccles, 2011; Tonoyan et al., 2020), women often begin their entrepreneurial careers at a disadvantage relative to men.

**2.1 Barriers to Women Entrepreneurs**

*Entrepreneurial Human Capital (EHC)*. Human capital (HC) consists of the skills and knowledge individuals acquire through their education, on-the-job training, and other relevant experiences (Becker, 2009; Coleman, 1988). The literature distinguishes between general HC, which relates to overall educational level and general work experience, and domain-specific HC, defined as a benefit from education and experience in a particular domain, e.g., entrepreneurship (Becker, 2009). Studies show that EHC (i.e., HC specific to the domain/context of entrepreneurship) is more important than general HC for entrepreneurial success (Rauch & Rijisdijk, 2013) and venture growth (Colombo & Grilli, 2005; Unger et al., 2011), and is especially critical for young ventures and novice entrepreneurs (Davidsson & Honig, 2003; Unger et al., 2011).

EHC is associated with entrepreneurial intentions (Bosma et al., 2004; Florin et al., 2003), and may assist in opportunity identification and the accumulation of entrepreneurial knowledge and skills (Ucbasaran et al., 2008). EHC is positively related to startup creation, growth, and survival (Cassar, 2006; Unger et al., 2011), and is associated with startup failure (Cooper et al., 1994).

Women, while often having higher general HC than men, are less likely to acquire formal education in business, finance, and STEM fields (Brush, 1992; Dutt & Kaplan, 2018; Elam, 2014; Menzies et al., 2004; Poggesi et al., 2020). Moreover, while first-time women and men entrepreneurs have, on average, similar previous work experience in terms of duration, women tend to have less business and managerial work experience when starting a business (e.g., Boden & Nucci, 2000; Brush et al., 2019). In contrast, women’s EHC tends to be lower than that of their male counterparts. As a result, their lack of relevant educational background and business experience places women at a disadvantage in the entrepreneurial process (Arenius & De Clercq, 2005; Dutt & Kaplan, 2018; Shane, 2003).

*Business Networks.* Networks refer to the social relationships that link individuals. Business networks are comprised of relationships that build social capital, i.e., the resources available to individuals through their networks (Coleman, 1988). Networks and social capital are crucial for entrepreneurial success (Greve & Salaff, 2003; Hoang & Antoncic, 2003). A high-quality network is a powerful asset for an entrepreneur, providing access to knowledge, potential customers, suppliers, partners, and investors (Elfring & Hulsink, 2003). A founders’ business network makes four important contributions to venture creation and development. First, it is an important source of new ideas, and helps to identify business opportunities (Bhagavatula et al., 2010) and to design and implement growth strategies (McAdam & McAdam, 2006). Second, an entrepreneur’s social network affects their ability to access necessary scarce resources (Elfring & Hulsink, 2003; Vohora et al., 2004). Third, high-quality networks and exposure to high-achieving role models can enhance entrepreneurial self-efficacy (BarNir et al., 2011; McGee et al., 2009). And, fourth, the social capital extracted from the network signals credibility, thereby enhancing legitimacy (Busenitz et al., 2005; Murphy et al., 2007).

Researchers have found that women and men entrepreneurs are embedded in different social networks, leading to divergent economic consequences (Brush et al., 2014; Moore, 1990; Renzulli et al., 2000). Women use their networks more for relationship-building, in contrast to men’s strategic and instrumental use (Ozkazanc‐Pan & Clark Muntean, 2018). Women also tend to have smaller and more homogeneous networks that include more relatives and friends, while men’s networks are larger, more heterogeneous, and include more professional colleagues (Greve & Salaff, 2003; Renzulli et al., 2000). Women face additional impediments to networking in male-dominated environments (Marlow & McAdam, 2011) and industries (Linehan & Scullion, 2008), such as entrepreneurship in STEM related fields (Poggesi et al., 2016, 2020). As a consequence, women have greater difficulty acquiring informal mentors (McGowan et al., 2015; Noe, 1988), and are often excluded from investor networks, thus finding it harder to secure capital (Brush et al., 2014; Guzman & Kacperczyk, 2019). Lastly, the distinct structure of women’s networks leads to difficulties in connecting with reputable players, which can have an adverse impact on womens’ credibility and legitimacy as entrepreneurs (McAdam et al., 2019).

*Entrepreneurial Self-efficacy (ESE) and Self-confidence (ESC)*. Self-efficacy refers to an individual’s belief in their personal capabilities to successfully perform a job or a specific set of tasks (Bandura, 1997, 2012). Self-efficacy is a domain-specific psychological construct; hence ESE relates to a person’s confidence in their ability to successfully launch an entrepreneurial venture (Boyd & Vozikis, 1994; Chen et al., 1998; McGee et al., 2009). ESE and ESC are strongly associated with entrepreneurial intentions and actions (Arenius and Minniti, 2005; BarNir et al., 2001; Bosma et al., 2012; Boyd & Vozikis, 1994; Chen et al., 1998; De Noble et al., 1999; Ferreira et al., 2012; Garaika et al., 2019; Krueger et al., 2000; Newman et al., 2019; Wilson et al., 2009; Zhao et al., 2005), growth aspiration (Hechavarría et al., 2012; Spigel, 2017), and levels of revenue and employment growth (Baum & Locke, 2004; Mauer et al., 2017; Miao et al., 2017).

Research shows that women tend to have lower ESE than men (Baughn et al., 2006; Chen et al., 1998; Dempsey & Jennings, 2014; Wilson et al., 2009). Women’s lower ESE, in turn, is strongly linked to lower entrepreneurial intentions and outcomes (BarNir et al., 2011; Kickul et al., 2008; Wilson et al., 2007).

*Legitimacy and discrimination.* The successful creation and development of a new venture depends on resources and support from many external actors (Fisher et al., 2017; Vohora et al., 2004; Zimmerman & Zeitz, 2002). For such actors to provide a new venture with necessary resources and support, they must perceive the venture as legitimate (Fisher et al., 2017; Lounsbury & Glynn, 2001; van Werven et al., 2015) with respect to its congruency with social values, norms and expectations (Zelditch, 2001). Legitimacy plays a vital role in the process of creation, survival, and growth of new ventures (De Clercq & Voronov, 2009; Zimmerman & Zeitz, 2002), and is a significant component in new firm formation (Delmar & Shane, 2004; Zimmerman & Zeitz, 2002). In fact, legitimacy was suggested as the main challenge to a new venture’s development (Lounsbury & Glynn, 2001). Thus, legitimacy is an important means for overcoming the liability of novelty that contributes to the high percentage of failures of new ventures (Zimmerman & Zeitz, 2002).

Gender stereotypes may create barriers to women entrepreneurs in gaining legitimacy (Calás et al., 2009; Edelman et al., 2018). The Gender Role Congruity Theory highlights the difficulties women face in gaining legitimacy in areas viewed as masculine fields, and proposes that observers use different standards to evaluate performance of men and women in gendered contexts (Eagly & Karau, 2002; Koch et al., 2015). Thus, entrepreneurship, which is considered a masculine domain (Ahl, 2006; Gupta et al., 2009), dominated by masculine behaviors (Marlow & McAdam, 2011; McAdam et al., 2019) and masculine-specific values (Tatli et al., 2014), poses legitimacy challenges for women (Eagly & Karau, 2002) when seeking financing (Eddleston et al., 2016; Edelman et al., 2018; Guzman & Kacperczyk, 2019; Marlow & Patton, 2005; Murphy et al., 2007), or when approaching potential high-skilled employees, suppliers, customers, and partners (Zimmerman & Zeitz, 2002).

*Access to capital*. Obtaining financial resources is essential for new ventures (Davila et al., 2003), and has an impact on firm survival (Neeley & Van Auken, 2010) and performance (Hellmann & Puri, 2000). Access to external sources of finance is even more crucial for innovative startups that have high growth aspirations but suffer from a long “valley of death” (i.e., a long period with high expenditures and without revenues and earnings before commercialization [Auerswald & Branscomb, 2003]). Obtaining such resources is crucial for new ventures (Kafeshani et al., 2018), allowing leeway for experimentation and exploration of business opportunities (Wiklund & Shepherd, 2005), and signaling the quality of the startup to the labor market (Davila et al., 2003) and to potential customers and partners.

Limited access to capital is a primary barrier to women entrepreneurship (Brush et al., 2018; Campanella & Serino, 2019; De Andres et al, 2020; Marlow & Patton, 2005). The venture capital (VC) industry, dominated by men, with men constituting 94% of VC partners (Brush et al., 2014; Brush et al., 2018), suffers from a strong bias against women. According to PitchBook (2016),[[1]](#footnote-1) during 2016–2017, companies with women founders received only 4.4% of the VC deals and just 2% of VC dollars. Brush et al., (2018) show that only 2.7% of VC investments were secured by women CEOs, even though VC-backed companies with women CEOs perform just as well as those with male CEOs. Investors, often men, are also more likely to invest in companies helmed by men than by women due to widespread bias against women entrepreneurs. This bias is caused by legitimacy issues, gender stereotypes and gender homophily (Carter et al., 2007; Guzman & Kacperczyk, 2019; Jennings & Brush, 2013; Kanze et al., 2018; Marlow & Swail, 2014). To wit, similar weaknesses might be viewed as more critical for women than for men (Ahl, 2006), thereby leading potential investors to view ventures created by women founders as less legitimate (Alsos & Ljunggren, 2017; Gupta et al., 2009; Morris et al., 2006); investors prefer the pitches of men entrepreneurs than those of women entrepreneurs, even when both pitches have the same content (Brooks et al., 2014); loan officers employ different evaluation criteria for men and women entrepreneurs (Carter et al., 2007); and, Brush et al. (2014) found that although many women entrepreneurs had the requisite skills and experience to lead high growth ventures, they raise substantially less venture capital. Biases against women are also evident in the different questions that investors ask women and men founders. Abouzahr et al. (2018) showed that women entrepreneurs, more than men entrepreneurs, are asked questions that challenge their basic understanding of technical issues. Kanze et al. (2018) found that investors tend to ask men entrepreneurs questions regarding potential success (i.e., promotion-focused questions), while the same investors ask women entrepreneurs questions regarding failure (i.e., prevention-focused questions). The different question types influence the type of responses by their respective founders, and, as a result, affect their likelihood of raising capital. These prejudices stand in contrast to the reality that while women entrepreneurs raise significantly less capital, they ultimately deliver significantly higher revenues per dollar invested (Abouzahr et al. 2018).

Another source of gender bias in access to capital may be attributable to the fact that many startups founded by women target issues and markets related to women, areas with which male investors are less familiar (Abouzahr et al., 2018; Coleman and Robb, 2009).

In summary, we have identified five obstacles that women in comparison to men tend to face in their entrepreneurial careers: lower entrepreneurial human capital (EHC), lower quality business networks, low entrepreneurial self-confidence (ESC) or self-efficacy (ESE), lower levels of legitimacy, and limited access to finance. We suggest that accelerators can assist in overcoming these barriers, thereby reducing the gender gap in entrepreneurship. The following section describes accelerators, and discusses their potential to overcome each of these obstacles to the benefit of women entrepreneurs.

**2.2 Accelerators’ Contribution to Startup Founders**

Accelerators act as short-term (three- to nine-month) boot camps for entrepreneurs, offering a structured developmental process that includes entrepreneurial training, mentoring services, and extensive business networks (Cohen et al., 2019a) focusing mainly on high-tech ventures (Chen, 2019). Accelerators serve as intermediaries, connecting startups and investors, thereby reducing information asymmetry (Chen, 2019) and providing standing and legitimacy to entrepreneurs and startups. Initial empirical evidence suggests that accelerators have the potential to create value for entrepreneurs (Hallen et al., 2020; Yu, 2020). A few studies examining the link between gender and accelerators’ impact have found mixed results (Chen, 2019; Dutt & Kaplan, 2018; Scott & Stu, 2017). We suggest that five supportive elements of accelerators ⸻entrepreneurial training, mentoring, networking, reputation (signaling entity) and fundraising training, and exposure to investors— work independently and jointly to overcome the five barriers women entrepreneurs face. Their use by women entrepreneurs can therefore increase the participation of women in entrepreneurial activities and contribute to their future success as we describe below.

1. *Entrepreneurial training.* Accelerators can provide either a shared formal educational program or create a tailored educational component for each startup. Through workshops, these components provide hands-on practice regarding the technical and managerial aspects of creating and running a high-growth venture, including fundraising. Often, these educational workshops are followed by actual practice with mentors and experts associated with the accelerator, or within the accelerator’s community of practice (Hamilton, 2011; Peters et al., 2004). This training can compensate for a founder’s lack of experience (Assenova, 2020; Chen, 2019) or lack of formal entrepreneurial education, and also contributes to founders’ ESE (Cadenas et al., 2020; Cox et al., 2002; Newman et al., 2019; Shinnar et al., 2014; Wilson et al., 2007, 2009; Zhao et al., 2005).
2. *Mentoring services.* Mentorship is an essential element of support that entrepreneurs can receive in accelerators (Assenova, 2020; Kuratko et al., 2020; Yitshaki, 2020; Yitshaki & Drori, 2018). Mentorship serves at least two important functions: it can provide socio-psychological support and it can provide functional or career-related support (Kram, 1983; St-Jean & Audet, 2012). In accelerators, entrepreneurs work with a wide array of mentors and experts who provide support for different aspects of the growing business. Each startup is typically assigned at least one mentor who gives the startup’s founders guidance, feedback, and advice, and often acts as a role model (Ghorashi & Asghari, 2019; Yitshaki, 2020).
3. *Wide network base.* Accelerators provide extensive networks of high-quality professionals and potential partners with numerous opportunities for in-network social interactions. Such assets and events are important for extending a founder’s networks (McAdam & McAdam, 2006). These networks are also provide founders with access to: pilots within large corporations, suppliers, valuable experts, and potential investors. Overall, accelerator managers and partners connect founders to local and global innovation ecosystems (Fehder & Hochberg, 2018) and offer access to an effective community of practice (Chen, 2019) in which founders can benefit from both learning opportunities and the networks (Hamilton, 2011; Peters et al., 2004; Wenger, 1999).
4. *Reputation.* The association with an accelerator can also confer the participating entrepreneurs with legitimacy. Signaling theory highlights the need for entrepreneurs to signal the viability of their new venture to capital providers, potential suppliers, customers, and potential partners (Busenitz et al., 2005; Murphy et al., 2007). Accelerators can act as such a signaling entity, especially considering that on average, the acceptance rate into an accelerator is lower than 5% (Chen, 2019).
5. *Fundraising training, demo-day and exposure to investors*. During their time at an accelerator, and sometimes also after graduation, founders are connected with potential investors, and often provided fundraising training. Finally, most programs conclude with a demo-day in which graduating founders present their startup to a large audience of investors and other agents from the ecosystem (Cohen, 2013; Cohen et al., 2019a).

We should note that while incubators (which are sometimes confused with accelerators) are also support systems that target novice entrepreneurs, their design is substantially different from that of startup accelerators (Cohen, 2013; Cohen et al., 2019a; Feld, 2020; Isabelle, 2013; Shankar & Clausen, 2020). Accelerators, in contrast to incubators, provide intensive entrepreneurial training and mentoring with a central focus on networking. Accelerators also typically use fast assumption validation processes, according to Lean Startup methodology (Mansoori et al., 2019; Shankar & Clausen, 2020). As such, our arguments herein might not be applicable to incubators, nor is the incubator academic literature necessarily relevant to our research. However, we do leave open the possibility that, to some degree, our research might also provide insights for incubators (and vice versa).

***2.2.1 Accelerators as a Source of Attraction for Women***

As mentioned above, women entrepreneurs often suffer from relatively low EHC. Thus, the entrepreneurial training provided by accelerators, especially in cases of hands-on practical workshops —which are often followed by hands-on practice with various experts associated with the accelerator— might be particularly valuable and appealing for women entrepreneurs. Moreover, mentorship processes within accelerators also assist in developing EHC and enhancing entrepreneurial learning (St-Jean & Audet, 2012; Sullivan, 2000), and are argued to be especially valuable for founders with lower EHC (Assenova, 2020; Peters et al., 2004). Thus, we expect the following statements to be true:

***H1a:*** *Women founders will rate improving EHC as a goal for participation in accelerator higher than will men founders.* ***H1b:*** *Women founders’ progress in improving EHC during the accelerator will be higher than will be that of men founders.*

As noted above, the second obstacle for women founders lies in their limited and less business-oriented networks (Moore, 1990) and their corresponding difficulty in acquiring informal mentoring (McGowan et al., 2015; Noe, 1988). Accelerators provide an extensive network base to founders and assign them mentors who often open their own networks to the founders. Mentors can also ultimately become integrated into the founders’ networks. Ozkazanc‐Pan and Clark Muntean (2018) explicitly refer to accelerators’ role of providing access to networks for women entrepreneurs. Moreover, because accelerators facilitate participants’ access to the relevant community of practice (Chen, 2019), we posit that accelerators explicitly assist women founders to expand their business-oriented network. As such, the following statements are also true:

***H2a:*** *Women founders will rate expanding their business networks as a goal for participation in an accelerator higher than will men founders.* ***H2b:*** *Women founders’ progress in expanding their business networks during the accelerator process will be higher than that of men founders.*

The mentorship literature suggests that a major role of mentors is providing psychosocial support (Kram, 1983). A central aspect of this support is enhancing one’s ESE (St-Jean & Audet, 2012; St-Jean & Mathieu, 2015). Mentors act as role models (St-Jean, 2011), which should also affect founders’ self-efficacy (BarNir et al., 2011; Garaika et al., 2019; Mauer et al., 2017; Newman et al., 2019). In addition, several studies have found that entrepreneurship education and training also contribute to the development of ESE (Cadenas et al., 2020; Cox et al., 2002; Newman et al., 2019; Shinnar et al., 2014; Wilson et al., 2007, 2009; Zhao et al., 2005), particularly for women (Wilson et al., 2007, 2009). We therefore expect that through the mentoring and entrepreneurial training they offer, accelerators assist in enhancing founder’s ESE or ESC, and that this impact is more significant for women founders than for men founders. Consequently:

***H3a:*** *Women founders will rate enhancing their ESE or ESC as a goal for participation in an accelerator higher than will men founders.* ***H3b:*** *Women founders’ increase in ESE or ESC during the accelerator process will be higher than that of men founders.*

Women entrepreneurs also suffer from a legitimacy barrier (Brush et al., 2019; Murphy et al., 2007). Accelerators, with their selection process, sponsors, management, partners, and expected results, can act as signaling entities for women founders and their respective startups (Chen, 2019). A continuous relationship with a prestigious mentor (Bangara et al., 2012; McKevitt & Marshall, 2015; van Werven et al., 2015) or advisor (Fisher et al., 2017) can also increase founder and startup legitimacy, as is also suggested by Bourdieu’s Theory of Capital (e.g., Tatli et al., 2014). McKevitt and Marshall (2015) suggest that legitimacy should be regarded as the third major function of mentoring (in addition to career and psychosocial support). More specifically, finding an appropriate mentor is pivotal in gaining entrepreneurial legitimacy, as mentors both guide behaviors in different business contexts (which leads to legitimacy), and signal a venture’s legitimacy (Marlow & McAdam, 2015). Murphy et al. (2007) found that expert capital (e.g., interaction with experts such as mentors) has a strong positive impact on women entrepreneurs’ legitimacy and credibility. Moreover, the community of practice created within and around the accelerator is also crucial for building entrepreneurial legitimacy. Hence, we expect that:

***H4a:*** *Women founders will rate increasing entrepreneurial legitimacy as a goal in participation in an accelerator higher than will men founders.* ***H4b:*** *Women founders’ increase in entrepreneurial legitimacy through an accelerator will be higher than that of men founders.*

Finally, a fundamental barrier to women entrepreneurship is their limited access to capital (e.g., Brush et al., 2018). Accelerators focus on this important aspect of startup development and effectively facilitate access to funding (Chen, 2019; IVC data 2020). In addition to connecting founders with potential investors, founders also meet with experts during the accelerator program to receive training and feedback about their readiness for investment. Relevant programs in an accelerator will also include extensive pitch training, which is important to attract investors’ initial interest (Balachandra et al., 2019). In addition, the accelerator program usually culminates in a demo-day, where graduating entrepreneurs pitch their startup to investors (Cohen, 2013; Hallen et al., 2020). Lastly, the networks that accelerators provide can provide access to capital (Elfring & Hulsink, 2003). Accelerators’ positive effect on founders’ legitimacy can also ease the way to raise capital (Deeds et al., 2004).

However, in contrast to the other four barriers to women’s entrepreneurship, we don't predict women entrepreneurs to identify fundraising as a central goal for joining an accelerator, even given the accelerator’s proven effect on startup founders’ ability to raise capital. In fact, we expect that women founders will be less likely to set fundraising as a goal in joining an accelerator than are men founders. Prior to seeking funding, entrepreneurs need to develop their entrepreneurial skills through, for example, increasing their EHC. If women founders join accelerators with lower EHC, and if they set increasing EHC as a central goal for their participation, it should be expected that fundraising will be a lower priority from them than for male founders at this stage. These differences should also apply to their startups. It is likely that startups of founders with lower EHC will be at an earlier stage when entering the accelerators, thus less ready for investment, further supporting our expectation that fundraising will be a less important goals for women founders in joining an accelerator than for men founders. Thus, even considering the impact of the accelerator on the ability to raise capital, we nevertheless expect that women founders will advance less than men founders in this aspect. Therefore:

***H5a:*** *Men founders perceive access to capital as an important goal in participation in the accelerator more so than will women founders.* ***H5b:*** *A woman founder’s increase in ability to raise capital will be lower than that of men founders.*

**3. MATERIAL AND METHOD**

**3.1 Data and Methodology**

The study was based on our findings from a macro level dataset of 71 startup accelerators in Israel, active between 2011 and 2019. The dataset includes all accelerators in Israel with at least five graduating startups as of December 2019. The dataset comprises 5,785 graduates and 2,671 startups representing at least 95% of startups that graduated from accelerators in Israel during that period. As each startup participates in 1.45 accelerators on average, the dataset actually only includes 1,842 unique startups and 4,052 unique founders. During the same years, approximately 10,000 startups were created in Israel (see IVC, 2019, 2020), thus, our sample represents nearly 20% of the startups created in Israel in the relevant period. Broadly, the dataset shows that the average percentage of women founders in accelerators (15.3%) is more than double that found in the general population of startup founders (7.4%).

Qualitative descriptive research data is based on fully-structured 45- minute interviews with women (*N* = 132, 16.9%) and men (*N* = 647, 83.1%) startup founders who had participated in accelerator programs in Israel during the 2011–2019 period. Trained research assistants interviewed graduates of the 71 accelerators mentioned above through telephone conversations (answers were coded in Qualtrics). The interviews addressed the accelerator program with no specific reference to gender or the goals of the current study (the interviews were part of a broader research project which does not focus on gender). We examined the goals of the founders in joining the program and their perceptions of their accelerators’ influence on their entrepreneurial human capital, networks, ESC and ESE, legitimacy, ability to raise capital, and other aspects not relevant to the current research.

*Participants and procedure.*Our initial database included 4,052 founders of startups who graduated from an accelerator program in Israel during 2011–2019. We approached 2,566 founders (63% of the entire population) from 1,168 startups for which we obtained contact details, inviting them to participate in the research. Our preference was to interview the CEO or the founder who was most involved in the accelerator. At this time, 779 founders have participated (an acceptable 30.4% response rate, 29.9% and 32.8% for men and women, respectively). This figure represents approximately 67% of the startups in the sample (on average, a startup in our sample had 2.2 founders).

**3.2 Measures**

*Pre-entry goals*. Participants were asked to report up to three main goals they had in joining their accelerator program. They rated how crucial they thought each goal was for their success, on a Likert-type scale ranging from 1 (very little) to 5 (very much). Their choices were classified into fifteen pre-defined goal types[[2]](#footnote-2) (goal types that were not mentioned were coded as zero). The list was developed through a pilot phase that included sixty in-depth open interviews with accelerator managers, mentors, and founders.

While gaining entrepreneurial knowledge and skills (i.e., enhance EHC), expanding network, and raising capital were often reported by participants, they did not report enhancing ESC/ESE or legitimacy as one of their primary pre-entry goals (although they were mentioned in the pilot open interviews as significant goals and progress). Hence, we added specific questions regarding these goals in later interviews (resulting in fewer observations for these variables). We assessed the goal of increasing ESC by asking, “How important as a pre-entry goal for you was enhancing your confidence that you can succeed as an entrepreneur?” While ESE is often measured with multiple items (e.g., Chen et al., 1998), due to practical considerations, we did not want to overburden participants. Such one-item assessments of ESC have been used before (e.g., Arenius & Minniti, 2005), and have been interpreted as an indicator for self-efficacy (Tominc & Rebernik, 2007). Participants were also asked, “How important as a pre-entry goal for you was strengthening your legitimacy as an entrepreneur?” Responses for both items were rated on a Likert-type scale ranging from 1 (very little) to 5 (very high). As these were leading questions, we expected their scores to be relatively high, but this should not have an effect on any gender differences found in the ratings.

*Progress during the program*. Respondents were asked to rank their progress during the program on a Likert-type scale ranging from 1 (very little) to 5 (very high), on their pre-entry goals and on up to three other aspects. Progress aspects were classified into the same fifteen types as the pre-entry goals (progress types that were not mentioned were coded as zero). In addition, respondents were asked how significant each of these aspects were for their success. We calculated a measure that captures both the amount of progress, and its importance (controlling, for example, for extensive progress in an aspect that is not crucial for success), by using the square root of the progress X importance multiplication. Thus, this measure approximates the true value that the accelerator provided to the founder for those aspects in which they feel they made the most progress during the program.

*Accelerators’ impact on participants’ ESE/ESC*. Participants were asked to rate ⸻ on a 7-point scale ranging from -3 (decreased a lot) through 0 (did not change) to +3 (increased a lot) ⸻ the change they experienced in their ESC (or unidimensional ESE) during the program (“my confidence I can succeed as an entrepreneur”). In addition, participants reported their perceived progress with regard to their ability to perform seven entrepreneurial functions (limited dimensional ESE). These functions were: assumption validation processes (i.e., the ability to identify necessary changes), the openness to implement changes, the ability to perform changes based on these validation processes, pitching and preparing investor presentations, acquiring customers, conducting market analysis, and business and revenue model planning. Responses were scored on a 5-point scale ranging from 1 to 5. Like existing ESE scales (e.g., Chen et al., 1998; De Noble et al., 1999; McGee et al., 2009), items represent various entrepreneurial tasks, but the items used here were chosen to reflect the lean startup methodology (Blank, 2013; Reis, 2011) which is the predominant framework of the accelerator training ethos (Mansoori et al., 2019). We averaged the seven items into to a single measure, with Cronbach alpha = .87, which we interpret as an approximation of participants’ ESE.

*Accelerators’ impact on participants’ legitimacy*. Participants were asked to rate six items on a 7-point scale ranging from -3 (decreased a lot) through 0 (did not change) to +3 (increased a lot). The ratings reflected the changes participants experienced regarding their legitimacy, and their startup’s legitimacy, in the eyes of venture capitalists (VCs), potential partners, and other ecosystem agents, following the program. The six ratings were combined to an aggregated measure of change in legitimacy (Cronbach alpha = .85).

*Insert Table 1a Here*

*Control variables*. For a secondary and exploratory analyses, we used control variables to examine the residual gender effects on our outcome variables, considering those variables that might account for gender differences. These control variables were: the founder’s age upon entering the program, the founder’s level of education prior to the program, (obtaining an MA or higher degree prior to the program was coded as 1, otherwise the variable was coded as 0), the founder’s entrepreneurial experience prior to the program (0 = no, 1 = yes), whether the founder entered the accelerator at the idea validations stage (0 = no, 1 = yes), and the founder’s prior accelerator participation experience (0 = no, 1 = yes). We do not have specific hypotheses regarding these regressions. Rather, we believe that assessing the robustness of gender effect on the outcome variables might illuminate some of their causes. Descriptions of the control appear in Table 1b.

*Additional background variables*. Finally, participants reported their educational and occupational background prior to the program.

*Insert Table 1b Here*

**3.3 Data Analysis**

We first compared mean ratings of background and control variables (see Table 2) to describe the data and examine differences between women and men in the sample. To test our hypotheses, we applied mean comparisons (t-test) of our dependent variables (pre-entry goals and progress) by gender to test each pair hypotheses. Since some of the variables are not normally distributed, we added Wilcoxon rank sum tests (WRS; see Table 4). Since our hypotheses are directional, *p* values are divided by 2. Next, we conducted regression analyses with the control variables. These regressions can show if gender accounts for additional variance, once we control for contextual and background variables.

**3.3.1 Characteristics of Women Entrepreneurs Who Participated in Accelerators**

Table 2 presents mean comparisons of the background and control variables by gender. There are a few interesting differences between men and women founders’ backgrounds. Women founders were more educated, with 54.5% having earned at least an MA degree, compared with 41.3% for men founders. The women founders were more likely than men to have been educated in the life sciences (16.7% vs. 5.9%), the social sciences, or the humanities (22.7% vs. 11.7%), but less likely to have been educated in technological subjects (e.g., computer, software, and engineering) (25.8% vs. 49.1%). There were no gender differences for management education.

Examining previous work experience, women founders had less years of entrepreneurial experience than men founders (3.5 years for women vs. 5.2 years for men), less experience in information and communication technology (ICT) domains (40.1% vs. 55.9%), less experience in in R&D positions (33.8% vs. 50.4%), but they had more experience in social domains (15.2% vs. 4.6%). Regarding experience in different types of companies, we found that women founders had less experience than men founders in startups (26.5% vs. 44.2%) and multinational corporations (25.0% vs. 34.5%), while they had more experience in NGOs (12.9% vs. 2.9%) and as self-employed workers (26.5% vs. 18.2%). Consequently, in the context of their formal education and work experience, women founders were less likely to create startups in the ICT sectors (54.5% vs. 69.7%), and more likely to create a startup in the life sciences (20.5% vs. 10.0%). In addition, Table 2 shows that women tended to enter accelerator programs while their startups were at an earlier stage of development (i.e., idea stage) compared to their male counterparts (49.2% vs. 32.9%).

*Insert Table 2 Here*

Tables 3a, 3b and 3c present correlations between gender, goal variables, progress variables and control variables.

*Insert Tables 3a, 3b and 4c Here*

To conclude, our descriptive data corresponds with the findings in the literature suggesting that while women entrepreneurs have higher general human capital, their EHC in terms of their educational field and work experience is lower than that of men. Moreover, as work experiences and education are important sources for network building (Arenius & De Clercq, 2005; Mosey & Wright, 2007; Shane, 2003), these differences also correspond with previous findings regarding business network gender differences (Brush et al., 2014).

**4. RESULTS**

In Table 4 we present the results of mean comparisons of the goal and progress variables by gender.

**4.1 Entrepreneurial Human Capital (EHC)**

Women rated gaining entrepreneurial knowledge and skills (i.e., increasing EHC) as a pre-entry goal significantly higher than men, *t*(777) = -3.66, *d = -.0.349, p* < 0.001, providing support for H1a that women founders join accelerators to increase their EHC more than do men founders. Women also rate their progress in increasing their entrepreneurial knowledge and skills following the program significantly higher than do men, *t*(777) = -3.67, d = -0.351, *p* < 0.001, providing support for H1b, that women founders make more improvement in their EHC than do founders during their time in an accelerator.

**4.2 Network**

Women rated expanding their networks as a pre-entry goal significantly higher than did men, *t*(777) = -2.60, d = -0.248, *p* = 0.005, providing support for H2a that women founders join accelerators to expand their network more than do men founders. Women also rated their progress in expanding their network significantly higher than did men, *t* (777) = -2.94, d = -0.280, *p* = 0.002, providing support for H2b, that women founders progress more than men founders in expanding their network during their time in an accelerator.

**4.3 Entrepreneurial Self-Confidence (ESC) and Entrepreneurial Self-efficacy (ESE)**

Women rated the importance of enhancing their ESC as a pre-entry goal significantly higher than did men, *t*(295) = -1.67, *d = -0.242, p* = 0.048, consistent with H3a that women founders join accelerators to increase their ESC and ESE more than do than men founders. As we do not have a full measure of enhancing ESE as a pre-entry goal, it can be considered as only partial support for H3a. In addition, women rated the influence of the program on their ESC as significantly higher than did men, *t*(765) = -3.46, *d = -0.331, p* < 0.001. Women also reported the impact of the program on their ESE as significantly higher than did men, *t*(763) = -2.74, d = -0.266, *p* = 0.003. Together, these findings provide support for H3b, that women founders progress more than men founders in enhancing their ESC and ECE in accelerators.

**4.4 Legitimacy**

Women rated enhancing legitimacy as a pre-entry goal significantly higher than did men, *t*(295) = -1.74, *d = -0.252, p* = 0.041, supporting H4a, that women founders join accelerators to increase their legitimacy more than do men founders. However, our result show that there was no significant difference between women and men in reported increases in their legitimacy, thus failing to support H4b.

**4.5 Access to Capital**

We remind the reader that our hypotheses regarding the ability to raise capital were contrary to our previous hypotheses, due to the expected earlier stages of both women’s entrepreneurial training and their startups. Table 4 shows that both predictions are confirmed. Women gave gaining access to capital and fundraising as a pre-entry goal significantly lower rating than did men, *t*(777) = 1.97, *d* = 0.188, *p* = 0.025, supporting H5a. Women also reported lower progress than men in that respect, although the effect was marginally significant, *t*(777) = 1.61, *d* = 0.154, *p* = 0.054, therefore providing partial support for H5b.

*Insert Table 4 here*

**4.6 Regression analyses**

In Tables 5a and 5b we present the results of regression analyses for the goal and progress variables, with gender as the independent variable and controlling for: age at entry, prior accelerator experience, MA degree and above, prior entrepreneurial experience, and whether the founder entered the accelerator at their startup’s idea/pre-seed stage. These regressions can show whether gender accounts for additional variance once we control for these other variables.

Since these analyses were conducted for exploratory reasons, with no specific predictions, and without claiming that all relevant controls are included, the overall picture they provide is of more interest than the specific effect of each outcome measure individually. Furthermore, these analyses neither undermine nor strengthen our initial hypotheses, as we make no claim that predicted gender differences are, or are not, caused exclusively by either gender or by associated background conditions. Thus, we present and discuss these regressions here to gain a broader understanding of the results.

Overall, gender had a significant residual effect in predicting whether the founder would seek to obtain, and ultimately progress in gaining entrepreneurial knowledge and skills during their time in the accelerator, the effect remained significant even when controlling for field of education, prior job positions, prior employment domain and type of company. Gender also significantly correlated with whether the founder would expand their networks and whether the founder would progress in entrepreneurial self-confidence and self-efficacy. For all other outcomes, gender did not explain additional variance in the regressions. Thus, the aggregate gender differences in these outcomes can be explained by gender differences in the control variables.

Entering the program with a venture only at the idea stage was a strong predictor for most outcomes (excluding network goal and progress and entrepreneurial self-confidence and legitimacy progress). Managing a relatively young startup may indicate fewer prior opportunities for gaining entrepreneurial knowledge, building one’s confidence and establishing the founder’s credibility. This might explain positive associations between these goals going into the accelerator and the entrepreneurial progress when completing the accelerator program. Notably the goal of expanding networks is relevant regardless of the maturity of the startup when the founder entered the accelerator program. On the contrary, managing a startup at a more mature stage increases the relevance of gaining access to capital through an accelerator and progressing in the fundraising journey. We can see this further in the negative correlation between being merely the idea stage of the startup’s life and the access to capital indicators. Finally, prior participation in accelerators, obtaining an MA degree or above, and prior entrepreneurial experience, might each suggest opportunities for gaining entrepreneurial and managerial knowledge prior to entering the accelerator. Indeed, each of these founder characteristics are negatively correlated with those two entrepreneurial indicators.

**4.7 Post-hoc Interaction Analyses**

Since our regression analyses showed that the maturity of the startup was a strong predictor for most of our outcome variables, we conducted additional analyses to examine whether the gender of the founder in any way moderates the associations between startup stage and the outcome variables. Such analyses can provide another indication as to whether or not gender explains differences beyond its effect as a background variable. The interaction predicting expanding networks was a significant, both as a goal, *B* = 0.92 (.36), *p* = .01, and as an aspect of progress, *B* = 0.78 (.37), *p* = .034, showing that the startup stage was positively associated with expanding networks (both as a goal and an aspect of progress) for women founders, but not for men founders. The correlation was also significant for progress in ESE, *B* = 0.41 (.19), *p* = .032, with the startup’s stage negatively associated with ESE gains for men founders, and not correlated at all for women founders (e.g., having a more mature startup did not decrease women’s reported gains in ESE). Finally, the gender of the founder also moderated the association between startup maturity and gains in legitimacy for their respective startups, *B* = 0.46 (.24), *p* = .05, with a negative association for men and positive association for women. Specifically, having a more mature startup was positively correlated with to feelings of gaining more legitimacy for women, whereas, a less mature startup had a lower correlation to feelings of gaining more legitimacy for women. Importantly, the interactions predicting fundraising (as both goal and progress) were not significant, again providing no evidence for inherent gender differences in access to capital.

**5. DISCUSSION AND CONCLUSIONS**

**5.1 Discussion**

Our study was driven by an initial finding that women founders’ participation rates in Israeli accelerators are significantly higher (15.3%) than their participation rate in the general startup sector in Israel (7.4%). This finding motivated us to examine the potential role of accelerators in enhancing women entrepreneurship through addressing the specific needs of women founders. In linking the design of accelerator programs in Israel to general barriers to female entrepreneurship, our results provide important evidence regarding what women founders aim to achieve by entering an accelerator program, and whether they ultimately find value in their accelerator programming.

We present evidence that women founders seek out more from an accelerator program and gain more entrepreneurial training during their participation in an accelerator than do men founders. We also found that women founders place more emphasis on strengthening their networks while in an accelerator program and ultimately succeed more in strengthening their networks than do men founders. In addition, we found that women entrepreneurs place more emphasis on enhancing their entrepreneurial self-confidence (ESC), and eventually are able to increase in both ESC and ESE as a result of the accelerator, in comparison to their male colleagues in the accelerator.

With regard to ESE, a recent finding by Gielnik et al. (2020) suggests that above a certain point, high levels of ESE might actually lead to overconfidence, thereby having a negative impact on entrepreneurship. In our sample, however, increases in ESE following the program were not associated with the founder’s belief in the current startup’s future success (*r* = .04, *p* = .59), indicating that the increase in ESE had not reached the point of overconfidence.

While women founders put more emphasis on increasing their legitimacy, they did not report more progress than did men founders in this aspect (though they did report making significant progress in this aspect, i.e., significantly higher than the neutral 0, *t* (83) = 10.88, *p* < 0.001).

These findings are consistent with known barriers to female entrepreneurship. These findings also highlight the potential value accelerators provide in addressing these barriers. They also suggest that accelerators that target specifically early-stage startups and provide more basic training (such as academic accelerators), might be especially valuable for women entrepreneurs. Supporting such accelerators might be an effective additional policy in the ongoing effort to advance the scale and impact of women-owned businesses.

In addition, both the initial goal of fundraising and obtaining access to capital, and the founder’s eventual progress in accessing capital and advancing fundraising were both lower for women founders, as we hypothesized (though their progress ratings was significantly higher than neutral 0, *t*(131) = 9.20, *p* < 0.001). We attribute this to the fact that access to capital and fundraising becomes more feasible once a startup has matured beyond the idea validation stage, and that acquiring basic entrepreneurial training has a higher priority than improving fundraising skills or opportunities. We further discuss the implications of this finding in the limitations section below.

Finally, controlling for background variables attenuated the effect of gender on some of the outcome variables (i.e., ESC/ESE, legitimacy, and access to capital). The attenuation of the role of gender indicates that for these variables, gender differences precede other factors (e.g., gender role socialization), but not that accelerators should overlook differences in the needs of women and men entrepreneurs. The effect of the founder’s gender with regard to gaining entrepreneurial knowledge and skills and expanding networks remains robust. This does not necessarily indicate inherent gender differences among founders. Rather those gained outcomes might be accounted for by other unobserved variables, for example, the extent and nature of a founder’s network prior to entering the accelerator.

According to the liberal feminism theory (Calás et al., 1999; Phillips, 1987), women and men are effectively similar and equally able (Ahl, 2006). As such, observed differences in entrepreneurial tendency, actions, and performances are grounded in discrimination, gendered socialization, and unequal access to essential resources and experiences, such as education, relevant work experience, social networks, role models and mentors (Ahl, 2006; Boden and Nucci, 2000; Greene et al., 2001; Fischer et al., 1993). This liberal feminist outlook would suggest that accelerators specifically and successfully promote women entrepreneurs not because of their gender, but rather due to their typical background conditions that are a potential result of their gender. According to this viewpoint, women-friendly accelerators (e.g., accelerators that accept and treat women and men founders equally) would be best suited for women. Drawing on this perspective, some of our conclusions could also be applicable to men founders that start their entrepreneurial career with disadvantages similar to their female counterparts, and perhaps more importantly, to founders from underrepresented populations in general, both female and male.

In contrast, the radical feminist theory (Calás et al., 1999; Rowland, & Klein, 1996) posits that there are inherent differences between women and men that are not fully explained by external factors (Ahl, 2006). Accordingly, regardless of background conditions, women might require different support, accelerator design elements, and entrepreneurial processes to create a successful startups than would men. Scholars, as well as decision makers should, according to the radical feminist outlook, take into account these inherent differences, and the resulting gender-specific needs, when seeking to promote entrepreneurship. This outlook might stress the importance of specifically designing accelerators for women with their inherent differences in mind. This question is relevant to the current discussion of the advantages and disadvantages of creating women-focused accelerators, compared to the development of women-friendly accelerators (Brush and Elam, 2021). Our data cannot resolve this dispute, but it might be useful in suggesting viable directions for future research.

* 1. **Limitations**

Some limitations should be noted in interpreting our results. First, a large part of the data was self-reported by the founders reflecting their errors and biases. For example, gender differences in social desirability may have biased the results (e.g., Dalton & Ortegren, 2011), resulting in some women providing inaccurate and inflated ratings. However, according to our data, out of 15 pre-entry goals and advances, women reported significantly higher ratings in six goals and five advances, while men reported significantly higher ratings in two goals and three advances. There were no significant differences between the genders in seven of the goals and advances. Moreover, the findings for men and women were consistent with our hypotheses as described above. The fact that some gender effects were not significant after controlling for background variables should address the concern that the results might suffer from gender response bias.

Second, although we have shown that female participation rates were significantly higher in accelerators than in the general entrepreneurial population, some arguments can be raised against our interpretation that this is specifically because accelerators provide the kind of help that women founders need. In general, women tend to seek help more than do men in many different contexts (Bamberger, 2009). This tendency might cause them to seek the help of accelerators regardless of whether or not accelerators actually provide targeted help for issues that are of particular value to women. Additionally, we do not have data about applications to accelerators by gender, so the relative increase in women’s rates in accelerators might simply be due to gendered acceptance rates rather than gendered application rates. However, both alternative explanations for the higher proportion of women in accelerators do not negate neither our premise that accelerators, as designed, cater to the specific needs of women entrepreneurs, nor our findings that women founders actually require and advance more than men on most of these aspects.

Third, our data suggests that women advance less than men in their access to capital and in fundraising. Though this finding is consistent with our predictions and with previous findings (Chen, 2019; Dutt & Kaplan, 2020), it may seem to undermine our suggestion that accelerators promote women founders more than men founders (although women founders do advance on this aspect as well), especially considering the centrality of access to capital for entrepreneurial success (Brush et al., 2018). If accelerators do not ultimately reduce the gender gap in fundraising, that would indicate a serious flaw in our argument that accelerators can help close the entrepreneurial gender gap. However, we believe that there are some factors that that counter this concern. We posit that this finding that women advance less in accessing capital is, at least partly, the product of the first barrier (entrepreneurial human capital) and due to the specific maturity of their startups. Relative to men, women require more entrepreneurial training and their startups tend to be at earlier stages of development when they enter an accelerator. Consequently, an accelerator’s effects on actual fundraising might only be revealed in the long run, following an increase in entrepreneurial human capital and the maturation of the startup. As our data cannot show this long-term effect, this suggestion could be examined in future research.

Nonetheless, our data provide some evidence to support our premise. First, the startups of women founders in our sample tended to be at a more preliminary stage (i.e., idea validation) than those of men founders (*r* = -0.13, *p* < 0.001). If a venture is at a more preliminary stage, and its founder is still building their basic entrepreneurial skills, it follows that fundraising will be of lower priority. Targeting access to capital as a goal negatively correlated with both a startup being at the ideation stage (*r* = -0.15, *p* < 0.001) and with targeting EHC (*r* = -0.21, *p* < 0.001). Second, our regression (models 7, 8, 17 and 18) and interaction analyses did not indicate that gender has an effect on fundraising, both as a pre-entry goal and as an aspect of progress, once controlling for background variables. This suggests that gender differences in access to capital are caused by background conditions rather than by gender per se. Together, these results support the reasonable argument that accelerators are not imperative for women’s access to capital, and that, in the long run, they probably advance women founders in this important aspect as well. Our findings suggest that targeting short-term effect on fundraising, as was done in previous research, likely misses much of the value accelerators provide to women.

Fourth, our research was conducted in the Israeli entrepreneurial ecosystem. There may be some concerns regarding the generalizability of our findings to other entrepreneurial ecosystems. However, Israel is a leading and internationally connected entrepreneurial ecosystem (Compass, 2019), and the global barriers to women entrepreneurs are similar to those faced by Israeli women entrepreneurs. Thus, it is highly probable that accelerators in other ecosystems similarly address these barriers.

* 1. **Conclusions**

Women are substantially underrepresented in entrepreneurship roles in high-growth sectors (Brush et al., 2014; Morris et al., 2006; Langowitz & Minniti, 2007; Robb et al., 2014). Increasing their participation rate in entrepreneurial ventures can have important consequences for economic growth, financial independence, equality, and innovation (Hechavarría et al., 2019; Kelley et al., 2017). This study addressed the problem of low female participation in innovative entrepreneurial ventures by focusing on the role of startup accelerators, where female participation is noticeably higher than in the startup ecosystem, in supporting women entrepreneurship. We described five barriers for women entrepreneurship that are identified in the literature: low EHC, limited networks, low ESE/ESC; low legitimacy in the entrepreneurial ecosystem; and limited access to capital. We suggest that by minimizing these barriers the gender participation and success gaps in entrepreneurship will decrease. We examined our premises within the Israeli entrepreneurial ecosystem, which is among the world’s leading and influential entrepreneurial ecosystem (Compass, 2019).

We examined the specific types of support that accelerators provide — formal entrepreneurial training, network extension, intensive mentoring, reputation, and exposure to investors — in the context of the five barriers to female entrepreneurship, and suggested that accelerators address these barriers independently and simultaneously. With regard to the first three barriers mentioned, the impact of accelerators on women founders was stronger than on men founders. The impact remained positive for women for the other two barriers as well. We conclude that accelerators have the potential to act as powerful catalysts for women’s successful integration into the entrepreneurial ecosystem and in reducing the gender gap in entrepreneurship.

* 1. **Future Research**

This study suggests that accelerators may increase women’s participation in entrepreneurial ventures and presents initial evidence regarding the extent of the value that accelerators provide women founders. Additional lines of research should extend our findings through at least four different efforts. First, future research should aim to use measures other than self-reporting, such as objective data or ratings of program managers and mentors. This would increase the robustness of the findings. Second, future efforts should add objective and long-term performance measures (including fundraising measures) to support the premise that accelerators not only encourage female participation in entrepreneurship, but also promote their ultimate success. Such research should have a longitudinal design. Third, evidence should be collected from different entrepreneurial ecosystems, as this would increase the external validity of our findings. Fourth, our results should be tested in different types of accelerators to understand and appreciate to what extent our results might be generalized to the entire class of accelerators or are rather limited to specific types of accelerators.

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Table 1a: *Description of goals and progress variables*

|  |  |
| --- | --- |
| Know\_G | How critical was the goal of gaining entrepreneurial knowledge (in a scale of 1-5) and 0 if it was not a goal |
| Net\_G | How critical was the goal of expanding networks (in a scale of 1-5) and 0 if it was not a goal |
| ESC\_G | How critical was the goal of enhancing entrepreneurial self-efficacy (ESC) in a scale of 1-5 (this was a direct question, thus it was always mentioned – no 0)  |
| Legit\_G | How critical was the goal of enhancing entrepreneurial legitimacy in a scale of 1-5 (this was a direct question, thus it was always mentioned – no 0)  |
| Raise\_G | How critical was the goal of gaining access to capital (in a scale of 1-5) and 0 if it was not a goal |
| Know\_P | Progress level in entrepreneurial knowledge and skills during the accelerator program (on a scale of 0-5) |
| Net\_P | Progress level in expanding networks during the accelerator program (on a scale of 0-5) |
| ESC\_P | Level of change in entrepreneurial self-confidence during the accelerator program (on a scale of -3 to +3) |
| ESE\_P | Level of change in entrepreneurial self-efficacy during the accelerator program (on a scale of 1 to 5) |
| Legit\_P | Level of change in entrepreneurial legitimacy during the accelerator program (on a scale of -3 to +3) |
| Raise\_P | Progress level in access to capital during the accelerator program (on a scale of 0-5) |

\* The 15 pre-entry goals and progress variables that we collected included: 1) Gaining entrepreneurial knowledge and skills, 2) Expanding networks, 3) Enhancing ESC/ESE and 4) Gaining legitimacy, 5) Access to capital, 6) Sales and marketing, 7) Validation processes, 8) Product development, 9) Improving the pitching and presentation skills, 10) Business development, 11) Advancing the business plan, 12) Team building, 13) Personal development, 14) Gaining PR, 15) Joining an entrepreneurial community.

Table 1b: *Description of background and control variables*

|  |  |
| --- | --- |
| **Variable name** | **Variable description** |
| Female | 1 for women founder and 0 for man founder |
| Fuonder\_Age | Founder’s age when entered the accelerator |
| MA | 1 if the founder has at least a second degree, otherwise 0 |
| Edu\_Tech | 1 if the founder has a technology degree, otherwise 0 |
| Edu\_Mgt. | 1 if the founder has a degree in management, otherwise 0 |
| Edu\_LS | 1 if the founder has a degree in the life sciences, otherwise 0 |
| Edu\_H&S | 1 if the founder has a degree in the humanities or social sciences, otherwise 0 |
| Skill\_R&D | 1 if the founder has work experience in an R&D position, otherwise 0 |
| ICT\_domain | 1 if the founder worked in a firm in the ICT domain, otherwise 0 |
| Social\_domain | 1 if the founder worked in a firm in the social/impact domain, otherwise 0 |
| Entrep\_Exp. | 1 if the Founder has experience as an entrepreneur prior to the current startup, otherwise 0 |
| Self\_exp. | 1 if the founder has been self-employed, otherwise 0 |
| Startup\_exp. | 1 if the founder has work experience in a startup, otherwise 0 |
| MNC\_exp. | 1 if the founder has work experience in a multinational corporation, otherwise 0 |
| NGO\_exp. | 1 if the founder has work experience in an NGO, otherwise 0 |
| P\_accelerator | 1 if the founder has participated in an accelerator before the one interviewed about, otherwise 0 |
| Sector\_ICT | 1 if the startup is in the ICT domain, otherwise 0 |
| Sector\_LS | 1 if the startup is in the life sciences domain, otherwise 0 |
| Stage\_Idea | 1 if the startup is in the idea validation stage (prior to PSF), otherwise 0 |
| Stage\_MVP | 1 if the startup is in the product validation stage (between PSF and PMF), otherwise 0 |
| Stage\_Scale | 1 if the startup is in the scaleup stage (after PMF), otherwise 0 |

**Table 2:** *Background and control variables: t-tests (female=1, male=0)*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Female Mean (SD)** | **N Female** | **Male Mean (SD)** | **N****Male** | **T** |
| **Founder\_Age** | 779 | 36.4 (8.48) | 132 | 38.2 (10.1) | 647 | 1.88† |
| **A. Education** (%) |
| **MA** | 779 | 54.5 (50.0) | 132 | 41.3 (49.3) | 647 | -2.82\*\* |
| **Edu\_Tech** | 779 | 25.8 (49.3) | 132 | 49.1 (50.0) | 647 | 4.99\*\*\* |
| **Edu\_Mgt.** | 779 | 32.6 (47.0) | 132 | 36.9 (48.3) | 647 | .950 |
| **Edu\_LS** | 779 | 16.7 (37.4) | 132 | 5.9 (23.5) | 647 | -4.28\*\*\* |
| **Edu\_H&S** | 779 | 22.7 (48.3) | 132 | 11.7 (31.9) | 647 | -3.37\*\*\* |
| **B. Accelerator Pre-Entry Work Experience (%)** |
| **Skill\_R&D** | 779 | 31.8 (46.8) | 132 | 50.4 (50.0) | 647 | 3.93\*\*\* |
| **ICT\_domain** | 779 | 40.1 (49.2) | 132 | 55.9 (49.7) | 647 | 3.34\*\* |
| **Social\_domain** | 779 | 15.2 (36.0) | 132 | 4.6 (21.0) | 647 | -4.55\*\*\* |
| **Entrep\_exp** | 779 | 75.0 (43.5) | 132 | 73.9 (44.0) | 647 | -.267 |
| **Self\_exp** | 779 | 26.5 (44.3) | 132 | 18.2 (38.6) | 647 | -2.19\* |
| **Startup\_exp** | 779 | 26.5 (44.3) | 132 | 44.2 (49.7) | 647 | 3.79\*\*\* |
| **MNC\_exp** | 779 | 25.0 (43.5) | 132 | 34.5 (47.6) | 647 | 2.11\* |
| **NGO\_exp** | 779 | 12.9 (33.6) | 132 | 2.9 (16.9) | 647 | -5.03\*\*\* |
| **P\_accelerator** | 779 | 19.7 (39.9) | 132 | 20.1 (40.1) | 647 | .103 |
| **C. Startup Characteristics at Entry (%)** |
| **Sector\_ICT** | 779 | 54.5 (50.0) | 132 | 69.7 (46.0) | 647 | 3.40\*\*\* |
| **Sector\_LS** | 779 | 20.5 (40.5) | 132 | 10.0 (30.1) | 647 | -3.40\*\*\* |
| **Stage\_Idea** | 779 | 49.2 (40.6) | 132 | 32.9 (29.3) | 647 | -3.59\*\*\* |
| **Stage\_MVP** | 779 | 31.1 (46.5) | 132 | 39.3 (48.9) | 647 | 1.77 |
| **Stage\_Scale** | 779 | 19.7 (39.9) | 132 | 27.7 (44.8) | 647 | 1.90† |

Notes: \*\*\* p < .001; \*\* p < .01; \* p < .05, † p<.1

Table 3a: *PW Correlation Matrix – goals and control variables*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | Female | (1) | (2) | (3) | (4) | (5) |
| (1) Know\_G | .13\*\*\* | 1.00 |  |  |  |  |
| (2) Net\_G | .09\*\* | .03 | 1.00 |  |  |  |
| (3) ESC\_G | .10† | .23\*\*\* | .11† | 1.00 |  |  |
| (4) Legit\_G | .10† | .11† | .16\*\* | .69\*\*\* | 1.00 |  |
| (5) Raise\_G | -.07\* | -21\*\*\* | -.07† | -.01 | .04 | 1.00 |
| Founder\_age | -.07† | -.09\* | -.03 | -.09 | -.11† | .03 |
| P. accelerator | -.01 | -.20\*\*\* | .05 | -.10† | -.09 | .06 |
| MA | .10\*\* | -.11\*\* | -.03 | -.02 | -.08 | -.01 |
| Entrep\_exp. | .01 | -.07\* | -.10\*\* | -.12\* | -.10† | -.06† |
| Idea\_stage | .13\*\*\* | .25\*\*\* | .05 | .24\*\*\* | .21\*\*\* | -.15\*\*\* |

Notes: \*\*\* p < .001; \*\* p < .01; \* p < .05, † p<.1

Table 3b: *PW Correlation Matrix – progresses and control variables*

Notes: \*\*\* p < .001; \*\* p < .01; \* p < .05, † p<.1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | Female | (1) | (2) | (3) | (4) | (5) | (6) |
| (1) Know\_P | .13\*\*\* | 1.00 |  |  |  |  |  |
| (2) Net\_P | .10\*\* | .09\*\* | 1.00 |  |  |  |  |
| (3) ESC\_P | .12\*\*\* | .18\*\*\* | .08\* | 1.00 |  |  |  |
| (4) ESE\_P | .10\*\* | .21\*\*\* | .10\*\* | .37\*\*\* | 1.00 |  |  |
| (5) Legit\_P | -.01 | .13\*\* | .01 | .44\*\*\* | .36\*\*\* | 1.00 |  |
| (6) Raise\_P | -.06 | -.15\*\*\* | .01 | .04 | -.04 | .05 | 1.00 |
| Founder\_age | -.07† | -.06† | -.02 | -.17\*\*\* | -.08\* | -.07 | -.03 |
| P. accelerator | -.004 | -.20\*\*\* | -.008 | -.04 | -.10† | -.02 | .05 |
| MA | .10\*\* | -.09\* | -.02 | -.09\* | -.07† | -.07 | -.02 |
| Entrep\_exp. | .01 | -.09\* | -.09\* | -.08\* | >.01 | .03 | -.04 |
| Idea\_stage | .13\*\*\* | .27\*\*\* | .04 | .12\*\*\* | .21\*\*\* | .10\* | -.14\*\*\* |

Notes: \*\*\* p < .001; \*\* p < .01; \* p < .05, † p<.1

Table 3c: *PW Correlation Matrix – control variables*

Notes: \*\*\* p < .001; \*\* p < .01; \* p < .05, † p<.1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | (1) | (2) | (3) | (4) | (5) | (6) |
| (1) Female | 1.00 |  |  |  |  |  |
| (2) Founder\_age | -.07† | 1.00 |  |  |  |  |
| (3) P. accelerator | -.004 | -11\*\* | 1.00 |  |  |  |
| (4) MA | .10\*\* | .21\*\*\* | .03 | 1.00 |  |  |
| (5) Entrep\_exp. | .01 | .08\* | .02 | .06† | 1.00 |  |
| (6) Idea\_stage | .13\*\*\* | -.10\*\* | -.23\*\*\* | -.01 | -.02 | 1.00 |

Notes: \*\*\* p < .001; \*\* p < .01; \* p < .05, † p<.1

**Table 4:** *Goals and progress: t-tests and Wilcoxon rank sum tests (female=1, male=0)*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Female Mean (SD)** | **N Female** | **Male Mean (SD)** | **N****Male** | **T** | **ES****Cohen’s d** | **WRS (Pr)** |
| **A. Founder’s Pre-entry Goals Critical Level (scale 0-5; ESC and Legitimacy scale: 1-5)** |
| **Know\_G** | 779 | 1.71 (2.21) | 132 | 1.05 (1.81) | 647 | -3.66\*\*\* | -.349 | <.001 |
| **Net\_G** | 779 | 1.58 (2.12) | 132 | 1.12 (1.79) | 647 | -2.60\*\* | -.248 | .001 |
| **ESC\_G** | 297 | 2.93 (1.54) | 60 | 2.57 (1.52) | 237 | -1.67\* | -.242 | .050 |
| **Legit\_G** | 297 | 2.82 (1.63) | 60 | 2.43 (1.53) | 237 | -1.74\* | -.252 | .042 |
| **Raise\_Goal** | 779 | 1.66 (2.07) | 647 | 2.08 (2.22) | 132 | 1.97\* | .188 | .001 |
| **B. Founders’ Progress Level (scale 0-5; ESC and Legitimacy scale: -3 to +3) during the accelerator** |
| **Know\_P** | 779 | 1.88 (1.50) | 132 | 1.20 (1.06) | 647 | -3.67\*\*\* | -.351 | <.001 |
| **Net\_P** | 779 | 1.90 (2.14) | 132 | 1.36 (1.86) | 647 | -2.94\*\* | -.280 | .002 |
| **ESC\_P** | 767 | 1.79 (1.26) | 132 | 1.34 (1.35) | 635 | -3.46\*\*\* | -.331 | <.001 |
| **ESE\_P** | 752 | 3.04 (0.96) | 129 | 2.78 (1.00) | 623 | -2.74\*\* | -.266 | .012 |
| **Legit\_P** | 452 | 1.24 (1.04) | 84 | 1.27 (0.96) | 368 | .316 | .038 | .845 |
| **Raise\_P** | 779 | 1.48 (1.84) | 132 | 1.77 (1.89) | 647 | 1.61† | .154 | .059 |

Notes: \*\*\* p < .001; \*\* p < .01; \* p < .05, † p<.1

We have a directional hypotheses thus we use a one-sided p-value

Sample size for ESC and legitimacy variables are smaller since these questions were added after data collection was already in progress.

**Table 5a:** *OLS Regressions - Dependent variables: Founders’ goals prior to entry*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| DV | Know\_G | Net\_G | ESC\_G | ESC\_G | Legit\_G | Legit\_G | Raise\_G | Raise\_G |
| Female | .561\*\*(.174) | .445\*(.179) | .290(.219) | .249(.217) | .344(.225) | .344(.223) | -.298(.211) | -.154(.210) |
| Founder\_Age | -.011(.007) | .001(.007) | -.007(.009) | -.004(.009) | -.009(.009) | -.006(.009) | .005(.008) | .003(.008) |
| P\_Accelerator | -.737\*\*\*(.167) | .333†(.171) | -.306(.275) | -.281(.278) | -.299(.283) | -.407(.287) | .166(.203) | .032(.202) |
| MA | -.357\*\*(.134) | -.117(.137) | .068(.185) | .128(.183) | -.135(.190) | -.103(.189) | -.019(.162) | -.104(.160) |
| Entrep\_Exp | -.248\*(.147) | -.406\*\*(.151) | -.300(.196) | -.259(.194) | -.246(.201) | -.184(.201) | -.323†(.178) | -.406\*(.177) |
| Stage\_idea | .759\*\*\*(.140) | .225(.144) | .620\*\*(.183) | .495\*\*(.186) | .514\*\*(.188) | .491\*(.192) | -.606\*\*\*(.170) | -.426\*(.170) |
| Know\_G | - | - | - | .121\*\*(.046) | - | .021(.047) | - | -.214\*\*\*(0.43) |
| Net\_G | - | - | - | .083\*(.045) | - | .128\*\*(.047) | - | -.073†(.042) |
| Constant | 1.69\*\*\*(.294) | 1.31\*\*\*(.301) | 2.76\*\*\*(.403) | 2.40\*\*\*(.417) | 2.78\*\*\*(.414) | 2.45\*\*\*(.430) | 2.30\*\*\*(.356) | 2.76\*\*\*(.362) |
| F-value | 16.29 | 3.36 | 4.03 | 4.40 | 3.42 | 3.58 | 3.88 | 6.53 |
| p-value | .0000 | .0028 | .0007 | .0000 | .0028 | .0006 | .0008 | .0000 |
| R2 (adj.) | .1055 | .0179 | .0578 | .0842 | .0468 | .0651 | .0217 | .0538 |
| N | 779 | 779 | 297 | 297 | 297 | 297 | 779 | 779 |

Standard errors are reported in parentheses.

\*\*\* p < .001; \*\* p < .01; \* p < .05, † p<.1

**Table 5b:** *OLS Regressions - Dependent variables: Founders’ progresses*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| DV | Know\_P | Net\_P | ESC\_P | ESC\_P | ESE\_P | ESE\_P | Legit\_P | Legit\_P | Raise\_P | Raise\_P |
| Female | .567\*\*(.179) | .533\*\*(.185) | .401\*\*(.128) | .333\*(.128) | .214\*(.097) | .152(.097) | -.068(.120) | -.098(.120) | -.204(.181) | -.146(.182) |
| Founder\_Age | -.005(.007) | .002(.007) | -.019\*\*\*(.005) | -.018\*\*\*(.005) | -.005(.004) | -.004(.004) | -.005(.005) | -.0045(.005) | -.007(.007) | -.007(.007) |
| P\_Accelerator | -.708\*\*\*(.171) | .094(.178) | -.094(.124) | -.032(.124) | -.160†(.094) | -.115(.094) | -.030(.132) | .013(.133) | .085(.174) | -.002(.175) |
| MA | -.3145\*(.137) | -.094(.143) | -.191†(.099) | -.162(.099) | -.138†(.075) | -.115(.074) | -.113(.096) | -.104(.096) | -.036(.139) | -.072(.139) |
| Entrep\_Exp | -.349\*(.151) | -.374\*(.157) | -.191†(.109) | -.146(.109) | .040(.083) | .079(.083) | .107(.108) | .123(.108) | -.179(.153) | -.215(.153) |
| Stage\_idea | .893\*\*\*(.144) | .140(.149) | .249\*(.103) | .164(.105) | .381\*\*\*(.078) | .311\*\*\*(.079) | .178†(.096) | .132(.098) | -.546\*\*\*(.146) | -.441\*\*(.149) |
| Know\_P | - | - | - | .092\*\*\*(.026) | - | .071\*\*\*(.019) | - | .057\*(.024) | - | -.120\*\*(.035) |
| Net\_P | - | - | - | .032(.025) | - | .041\*(.019) | - | .001(.024) | - | .016(.035) |
| Constant | 1.64\*\*\*(.301) | 1.54\*\*\*(.313) | 2.22\*\*\*(.216) | 2.01\*\*\*(.222) | 2.76\*\*\*(.173) | 2.70\*\*\*(.168) | 1.35\*\*\*(.235) | 1.25\*\*\*(.222) | 2.33\*\*\*(.305) | 2.51\*\*\*(.313) |
| F-value | 17.28 | 2.65 | 8.18 | 8.14 | 8.05 | 8.63 | 1.38 | 1.77 | 3.47 | 3.99 |
| p-value | .0000 | .0149 | .0000 | .0000 | .0000 | .0000 | .2201 | .0814 | .0022 | .0001 |
| R2 (adj.) | .1115 | .0126 | .0532 | .0694 | .0533 | .0752 | .0051 | .0134 | .0187 | .0298 |
| N | 779 | 779 | 767 | 767 | 752 | 752 | 452 | 452 | 779 | 779 |

Standard errors are reported in parentheses.

\*\*\* p < .001; \*\* p < .01; \* p < .05, † p<.1

1. https://pitchbook.com/news/articles/one-third-of-us-startups-that-raised-a-series-a-in-2015-went-through-an-accelerator [↑](#footnote-ref-1)
2. The 15 pre-entry goals and progress variables that we collected included: 1) Gaining entrepreneurial knowledge and skills; 2) Expanding networks; 3) Enhancing ESC/ESE; 4) Gaining legitimacy; 5) Access to capital; 6) Sales and marketing, 7) Validation processes; 8) Product development; 9) Improving pitching and presentation skills; 10) Business development; 11) Advancing the business plan; 12) Team building; 13) Personal development; 14) Gaining exposure; and, 15) Joining an entrepreneurial community. [↑](#footnote-ref-2)