**1. INTRODUCTION**

Despite a significant increase in women’s higher education attainment and labor market participation over recent decades (Petrongolo & Ronchi, 2020; Goldin 2006), women are still significantly less likely than men to become entrepreneurs. While recent government policies to boost women’s participation in entrepreneurship have been implemented with some success (Bullough et al., 2019), women remain underrepresented in the entrepreneurial arena (Elam, 2008; Langowitz & Minniti, 2007), especially in high-growth sectors (Brush et al., 2014; Elam et al., 2019; Marlow & McAdam, 2011; Morris et al., 2006; Robb et al., 2014). Thus, women’s participation in high-growth entrepreneurship warrants particular attention to develop effective measures that provide equal opportunities.

In the Israeli high-tech sector, our focal entrepreneurial ecosystem, out of 26,541 innovative startup founders between 1997 and 2018, only 7.4% (1,957) were women (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 women CEOs (IVC Online Report, 2018). These figures are far below 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 that women and men are similar in entrepreneurial intentions (Elam et al., 2019) and innovativeness (DeTienne & Chandler, 2007), and that research has found that gender per se does not explain 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 et al., 2013). Therefore, it is vital to target and address those gender-related conditions that hinder female entrepreneurship.

Understanding the causes of women’s low rate of participation in innovative entrepreneurship and identifying possible means of addressing these reasons is of scholarly interest and practical importance. Identifying the entry and growth challenges to female entrepreneurship and ways of overcoming them can help stakeholders, such as educators, policy makers, and program leaders better align the support they provide with women’s specific needs to more effectively advance their participation in entrepreneurship. A review of the literature reveals various obstacles to female entrepreneurship, from which we have distilled five main categories: a) low rates of entrepreneurial human capital; b) low-quality business networks; c) low levels of entrepreneurial self-efficacy and confidence; d) discrimination, stereotypes and legitimacy issues in the entrepreneurial ecosystem; and e) limited access to financing.

We propose that startup accelerators, a new form of entrepreneurial support system, could attract more female founders, as their organizational design addresses these five common obstacles facing women. Accelerators are becoming increasingly important actors in the innovative entrepreneurial ecosystem; approximately one-third of first-time startups in the United States (Chen, 2019) and about 20% of startups founded in Israel from 2011 through 2019 (based on our analysis of IVC 2020 data) were accelerator-backed startups. Thus, they are expected to play a pivotal role in decreasing the gender gap in entrepreneurship.

This study grew out of our initial finding that the participation rates of female founders in startup accelerators in Israel are significantly higher than 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 that includes the majority of accelerator startup graduates in the country at that time. According to this data, the average rate of female 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 female entrepreneurs’ needs and to identify the mechanisms that explain how accelerators’ designs match these needs and facilitate women’s successful integration into the Israeli high-tech sector. We suggest that this increased participation rate can be attributed to specific characteristics of startup accelerators that address the particular disadvantages of female entrepreneurs. This study aims to systematically examine the role of startup accelerators in female entrepreneurship by describing the five main obstacles facing female entrepreneurs and their corresponding needs, presenting the main design characteristics of accelerators, identifying which features meet female entrepreneurs’ specific needs and how, and empirically testing our assumptions.

This study contributes to the literature in several respects. First, it brings together and reviews the various barriers to female entrepreneurship, providing a comprehensive and concise overview of the challenges women 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 their interrelations (see also Elam’s 2008 discussion of Bourdieu’s theory of action). Second, we present evidence that accelerators are potentially a significant tool for enhancing women’s participation as founders of innovative high-growth startups. We do so by linking the elements of accelerators’ design to female founders’ particular needs, thereby suggesting some generalized policy implications for the field of female entrepreneurship. Third, we built and used a unique and rich dataset documenting the goals, experiences, and outcomes of 779 accelerator graduates in Israel’s high-tech sector from 2011 through 2019. Fourth, we provide evidence of the impact accelerators have on founders and on startup progress as direct and immediate results of the program, rather than focusing on long-term outcomes that are subject to selection issues (such as fundraising and successful exits), thus enriching the emerging literature on startup accelerators.

**2. LITERATURE REVIEW AND** **RESEARCH HYPOTHESES**

Before describing the five main barriers to female 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 alone does not account for entrepreneurial success or firm performance. We posit that women often begin their entrepreneurial careers at a disadvantage relative to men due to complex social factors beyond the scope of this paper, including discrimination, educational and occupational gender role socialization, and stereotypes (Eccles, 1994; Eccles, 2011; Tonoyan et al., 2020).

**2.1 Barriers to Female Entrepreneurs**

*Entrepreneurial Human Capital*. Human capital consists of the skills and knowledge individuals acquire through formal education, on-the-job training, and other relevant experiences (Becker, 2009; Coleman, 1988). The literature distinguishes between general human capital—the overall educational level and work experience—and domain-specific human capital, defined as education and experience in a particular area, e.g., entrepreneurship (Becker, 2009). Studies show that entrepreneurial human capital (i.e., human capital specific to entrepreneurship) is more important than general human capital 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).

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

Women, while often possessing higher general human capital than men, are less likely to have studied business, finance, or STEM fields (Brush, 1992; Dutt & Kaplan, 2018; Elam, 2008; Elam et al., 2019; Menzies et al., 2004; Poggesi et al., 2020). Moreover, while first-time female and male 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). Their lack of relevant educational background and business experience place 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 and build social capital (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 founder’s business network makes four important contributions to venture creation and development. First, networks are important sources of new ideas; they help identify business opportunities (Bhagavatula et al., 2010) and design and implement growth strategies (McAdam & McAdam, 2006). Second, networks affect an entrepreneur’s ability to access necessary scarce resources (Elfring & Hulsink, 2003; Vohora et al., 2004). Third, high-quality networks and exposure to successful role models can enhance entrepreneurial self-efficacy (BarNir et al., 2011; McGee et al., 2009). Finally, networks and social capital boost legitimacy (Busenitz et al., 2005; Murphy et al., 2007).

Researchers have found that male and female entrepreneurs are embedded in different social networks, leading to divergent economic outcomes (Brush et al., 2014; Moore, 1990; Renzulli et al., 2000). Women use their networks more for relationship-building, whereas men leverage networks for strategic and instrumental purposes (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 STEM-related fields (Poggesi et al., 2016, 2020). As a result, women have greater difficulty acquiring informal mentors (McGowan et al., 2015; Noe, 1988) and are often excluded from investor networks, thus finding it more difficult to secure capital (Brush et al., 2014; Guzman & Kacperczyk, 2019). Lastly, the distinctive structure of women’s networks leads to difficulties in connecting with reputable players, which can have an adverse impact on women’s legitimacy as entrepreneurs (McAdam et al., 2019). Exemplifying the importance of networks for female entrepreneurs, Tinkler et al. (2015) found that venture capitalists are less likely to discount female founders who have strong networks with reputable actors in the ecosystem.

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

Research shows that women tend to have lower levels of entrepreneurial confidence (Elam et al., 2019) and ESE (Baughn et al., 2006; Chen et al., 1998; Dempsey & Jennings, 2014; Wilson et al., 2009) than men. Across many countries, women tend to perceive themselves as less suited for entrepreneurship compared with men (Langowitz & Minniti, 2007). Women’s lower level of ESE is strongly linked to lower entrepreneurial intentions and outcomes (BarNir et al., 2011; Kickul et al., 2008; Wilson et al., 2007).

*Legitimacy.* A new venture's successful creation and development depend on resources and support from many external actors (Elam et al., 2019; Fisher et al., 2017; Vohora et al., 2004; Zimmerman & Zeitz, 2002). For such actors to provide a new venture with the necessary resources and support, they must perceive the founder and the venture as legitimate (De Clercq & Voronov, 2009; Fisher et al., 2017; Lounsbury & Glynn, 2001; van Werven et al., 2015) in terms of its congruency with social values, norms and expectations (Zelditch, 2001). Legitimacy is an important means for overcoming the liability of newness that contributes to the high failure rate of new ventures (Zimmerman & Zeitz, 2002). Thus, legitimacy plays a vital role in the formation, survival, and growth of new ventures (De Clercq & Voronov, 2009; Delmar & Shane, 2004; Lounsbury & Glynn, 2001; Zimmerman & Zeitz, 2002).

Gender stereotypes create barriers to the perceived legitimacy of female entrepreneurs (Calás et al., 2009; Edelman et al., 2018). Indeed, women are perceived by others as less suited for entrepreneurship than men (Langowitz & Minniti, 2007). Gender Role Congruity Theory highlights the difficulties women face in gaining legitimacy in areas traditionally perceived as masculine fields. Accordingly, observers use different standards to evaluate men’s and women’s performance in gendered contexts (Eagly & Karau, 2002; Koch et al., 2015). Entrepreneurship 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 (Ahl, 2004; Tatli et al., 2014), and, thus, 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-value employees, suppliers, customers, and partners (Zimmerman & Zeitz, 2002).

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

Limited access to capital is a primary barrier to female entrepreneurship (Brush et al., 2018; Campanella & Serino, 2019; De Andrés et al., 2020; Guzman & Kacperczyk, 2019; Marlow & Patton, 2005). The venture capital (VC) industry is dominated by men, who constitute 94% of VC partners (Brush et al., 2014; Brush et al., 2018), and is characterized by a strong bias against women. According to PitchBook (2016),[[1]](#footnote-1) during 2016–2017, companies with female 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 less likely to invest in companies helmed by women due to widespread bias against female entrepreneurs resulting from legitimacy issues, gender stereotypes, and gender homophily (Carter et al., 2007; Guzman & Kacperczyk, 2019; Jennings & Brush, 2013; Kanze et al., 2018; Marlow & Swail, 2014). Similar weaknesses could be viewed as more critical for women than for men (Ahl, 2006), leading potential investors to view female-founded ventures as less legitimate (Alsos & Ljunggren, 2017; Gupta et al., 2009; Morris et al., 2006). Investors prefer pitches by male entrepreneurs to those by female entrepreneurs with the same content (Brooks et al., 2014); loan officers employ different evaluation criteria for male and female entrepreneurs (Carter et al., 2007); and many women entrepreneurs with the requisite skills and experience to lead high-growth ventures raise substantially less venture capital (Brush et al.,2014).

Biases against women are also evident in the questions that investors ask female and male founders. Kanze et al. (2018) found that investors tend to ask male entrepreneurs questions regarding potential success (i.e., promotion-focused questions), while female entrepreneurs are asked questions regarding failure (i.e., prevention-focused questions). The different questions influence male and female founders’ responses and, as a result, affect their likelihood of raising capital. These prejudices clash with the finding 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 the fact that many startups founded by women target women-related issues and markets (Elam, 2008), with which male investors are less familiar (Abouzahr et al., 2018; Coleman and Robb, 2009).

Synthesizing the literature, we have identified five obstacles that women are more likely to face in their entrepreneurial careers: lower levels of entrepreneurial human capital, lower quality of business networks, less entrepreneurial confidence and self-efficacy (ESE), less perceived legitimacy, and limited access to finance. We suggest that accelerators can help overcome these barriers and reduce the gender gap in entrepreneurship. The following section describes accelerators and their potential to surmount these obstacles.

**2.2 Accelerators’ Contribution to Startup Founders**

Accelerators act as short-term “boot camps” of three to nine months for entrepreneurs focused mainly on high-tech ventures (Chen, 2019), offering a structured developmental and learning process that includes entrepreneurial training, mentoring services, and extensive business networks (Cohen et al., 2019a). Accelerators serve as intermediaries that connect startups and investors, reducing information asymmetry (Chen, 2019) and providing standing and legitimacy to both entrepreneurs and startups.

We should note that while incubators (sometimes confused with accelerators) are also support systems that target novice entrepreneurs, their design differs substantially from that of startup accelerators (Cohen, 2013; Cohen et al., 2019a; Feld, 2020; Isabelle, 2013; Shankar & Clausen, 2020). According to the Lean Startup methodology, accelerators are distinct from incubators in four respects: entrepreneurial training and educational component, intensive mentoring, focus on networks, and the typical use of fast assumption validation processes (Mansoori et al., 2019; Shankar & Clausen, 2020). As such, our arguments may not be fully applicable to incubators.

Initial empirical evidence suggests that accelerators create value for entrepreneurs (Hallen et al., 2020; Crisan el al., 2019; Yu, 2020). Few studies examining the link between gender and accelerators’ impact have had mixed results (Chen, 2019; Dutt & Kaplan, 2018; Scott & Stu, 2017). We suggest that five supportive elements of accelerators—entrepreneurial training, mentoring, networking, legitimation signaling entity, and fundraising support and training—work independently and jointly to overcome the five barriers female entrepreneurs face. Accelerators can, therefore, increase the participation of women in entrepreneurial activities and contribute to their future success.

1. *Entrepreneurial training.* Accelerators provide either a shared formal educational program or a tailored educational component for each startup. These components provide hands-on practice on the technical and managerial aspects of creating and running a high-growth venture. Educational workshops are often followed by hands-on practice with mentors and experts associated with the accelerator. This training can compensate for a founder’s lack of experience (Assenova, 2020; Chen, 2019) or lack of formal entrepreneurial education.
2. *Mentoring services.* Mentorship is an essential element of the support that entrepreneurs receive in accelerators (Assenova, 2020; Kuratko et al., 2021; Yitshaki, 2020; Yitshaki & Drori, 2018). Mentorship offers two important types of support: socio-psychological and functional (Kram, 1983; St-Jean & Audet, 2012). 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 provides the founders with guidance, feedback, and advice and who often acts as a role model (Ghorashi & Asghari, 2019; Yitshaki, 2020).
3. *Wide network base.* Accelerators provide extensive networks of professionals and potential partners and numerous opportunities for social interactions, all of which are important for extending a founder’s networks (McAdam & McAdam, 2006). These networks also assist founders with access to pilots within large corporations, suppliers, valuable experts, and potential investors. In addition, 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 learning and networking opportunities (Hamilton, 2011; Peters et al., 2004; Wenger, 1999).
4. *Legitimation signaling entity.* Signaling theory highlights the need for entrepreneurs to signal their credibility and the viability of their new venture to capital providers, potential suppliers, customers, and partners (Busenitz et al., 2005; Murphy et al., 2007). Accelerators can act as such a signaling entity, considering that their average acceptance rate is less than 5% (Chen, 2019). The continuous relationship with prestigious mentors and partners within the accelerator can also confer legitimacy on the participating founders and startups (Bangara et al., 2012; McKevitt & Marshall, 2015; van Werven et al., 2015).
5. *Fundraising support and training*. Accelerators often provide participants with financial support (Crisan el al., 2019) and pitching and fundraising training (Miles et al., 2017; Moritz et al., 2021), as well as connect them with potential investors. Most programs conclude with a demo day in which graduating founders present their startups to a large audience of investors and other agents from the ecosystem (Cohen, 2013; Cohen et al., 2019a; Dushnitsky & Sarkar, 2021).

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

We assume that people who decide to engage in entrepreneurship are generally aware of what they need to do to succeed as entrepreneurs, at least to some extent, and this should be evident in the goals they establish for their participation in accelerator programs. Further support for this assumption is found in previous research on the barriers to female entrepreneurship based on qualitative interviews (e.g., xx, xx) and self-reports (e.g., xx, xx), and our pilot interviews also indicated that entrepreneurs are aware of their needs. Thus, if women and men differ in their needs, we should expect to see differences in their self-defined goals. At the same time, if accelerators’ design is suited to address these needs and resulting goals, we should expect to observe corresponding differences in the progress made during the program. For example, if we assume that women are aware of their lack of entrepreneurial experience, they are more likely than men to establish gaining entrepreneurial knowledge as a goal of the program. If accelerators provide entrepreneurial knowledge and training, women are expected to gain more in this aspect as they are more focused on making such gains.

As noted, female novice entrepreneurs often suffer from relatively low levels of entrepreneurial human capital. Thus, the entrepreneurial training provided by the accelerator program, expected to develop entrepreneurial human capital, could be particularly valuable for and appealing to female entrepreneurs. Moreover, mentorship processes within accelerators also assist in developing entrepreneurial human capital and enhancing entrepreneurial learning (St-Jean & Audet, 2012; Sullivan, 2000) and are especially valuable for founders with lower levels of entrepreneurial human capital (Assenova, 2020; Peters et al., 2004). Thus, we expect that:

***H1a:*** *Female founders will rate improving entrepreneurial human capital as a goal of participation in accelerators higher than will male founders.* ***H1b:*** *Female founders’ improvement in entrepreneurial human capital during the accelerator will be greater than that of male founders.*

The second obstacle for female founders lies in their limited and fewer business-oriented networks and the related difficulty in acquiring informal mentoring. Accelerators provide an extensive network base to founders (Ozkazanc‐Pan & Clark Muntean, 2018) and facilitate participants’ access to the relevant communities of practice (Chen, 2019). Founders are also assigned mentors who often open their own networks to the founders, ultimately becoming integrated into the founders’ networks. We, therefore, posit that accelerators assist female founders in expanding their business-oriented networks and expect that:

***H2a:*** *Female founders will rate expanding their business networks as a goal of participating in an accelerator higher than will male founders.* ***H2b:*** *Female founders will expand their business networks during the accelerator more than will male founders.*

The third obstacle for female entrepreneurs is their lower levels of ESE and confidence. The mentorship literature suggests that a major role of mentors is to provide psychosocial support (Kram, 1983), a central aspect of which is enhancing the mentee’s ESE (St-Jean & Audet, 2012; St-Jean & Mathieu, 2015). Mentors act as role models (St-Jean, 2011) who can also strengthen 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 provided by accelerators also contribute to the development of ESE (Cadenas et al., 2020; Cox et al., 2002; Newman et al., 2019; Shinnar et al., 2014; Zhao et al., 2005), particularly in the case of women (Wilson et al., 2007, 2009). We, therefore, expect that accelerators’ mentoring and entrepreneurial training can enhance founders’ ESE and confidence, and that this impact is more pronounced for female founders than for male founders:

***H3a:*** *Female founders will rate enhancing their ESE or confidence as a goal for participation in an accelerator higher than will male founders.* ***H3b:*** *Female founders’ increase in ESE or confidence during the accelerator will be greater than that of male founders.*

Female entrepreneurs also suffer from legitimacy barriers (Brush et al., 2019; Murphy et al., 2007), and their legitimacy might be enhanced by associating themselves with reputable organizations (Rao et al., 2008). Accelerators, with their intense selection process, experienced management team, and prestigious sponsors and mentors could be viewed as a reputable organization that serves as a signaling entity capable of enhancing the legitimacy of female founders and their startups. Moreover, a continuous relationship with prestigious mentors, advisors, or managers can increase founder and startup legitimacy (Bangara et al., 2012; Fisher et al., 2017; McKevitt & Marshall, 2015; van Werven et al., 2015), as suggested by Bourdieu’s theory of capital (e.g., Tatli et al., 2014). McKevitt and Marshall (2015) submit 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 was found to be pivotal in gaining entrepreneurial legitimacy, as mentors 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 female entrepreneurs’ legitimacy and credibility. Hence, we expect that:

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

Finally, a fundamental barrier to female entrepreneurship is the limited access to capital (e.g., Brush et al., 2018). Accelerators focus on this important aspect of startup development and are increasing their impact on fundraising (Chen, 2019; IVC data 2020). During the accelerator program, founders are trained in pitching[[2]](#footnote-2) and fundraising practices, get connected with potential investors, and meet with experts to receive feedback about their readiness for investment. In addition, the programs usually culminate in a demo-day, where graduating entrepreneurs pitch their startups to investors (Cohen, 2013; Hallen et al., 2020). Lastly, accelerator networks can provide access to capital (Elfring & Hulsink, 2003), and their positive effect on founders’ legitimacy can facilitate raising capital (Deeds et al., 2004).

Given the importance of fundraising to new startups’ development and survival (e.g., Davila et al., 2003; Neeley & Van Auken, 2010), and the disadvantages women face in this regard (e.g., Brush et al., 201), it is reasonable to expect that fundraising would be a high priority for women joining accelerators. While this reasoning is sound, and in contrast to the other four barriers to female entrepreneurship, we propose that female founders are less likely than male founders to set fundraising as a major goal in an accelerator. Before seeking funding, entrepreneurs need to develop their entrepreneurial skills and advance their startups. If female founders join accelerators with lower levels of entrepreneurial human capital, and if they set acquiring entrepreneurial human capital as a central goal of their participation, as we suggest, it should follow that fundraising would be a lesser priority for them than for male founders at this stage. Moreover, our database suggests that female founders join accelerators with startups at earlier stages of development, which are less ready for investment at that point in time, suggesting that female founders will make less progress in the fundraising dimension during the accelerator program.

We do not deny the great importance of fundraising for female entrepreneurs who join accelerators, but rather that, compared with male entrepreneurs, we expect it to be relatively less important at that particular point in time.

Therefore:

***H5a:*** *Female founders will rate access to capital as a goal of participation in the accelerator less than male founders.* ***H5b:*** *Female founders’ improvement in their ability to raise capital will be lower than that of male founders.*

**3. MATERIALS 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, including all active accelerators between 2011 and 2019 with at least five graduating startups as of December 2019. The dataset comprises 4,052 unique graduates and 1,842 unique startups (each startup participated in 1.45 accelerators on average), representing at least 95% of startups that graduated from accelerators in Israel during that period. During the same years, approximately 10,000 startups were created in Israel (see IVC, 2019, 2020); thus, our sample represents nearly 20% of Israeli startups founded in the period. This dataset shows that the average percentage of female founders in accelerators (15.3%) is more than double that found in the general population of startup founders (7.4%).

*Participants and procedures.*We approached 2,566 founders whose contact information we obtained from the initial dataset (63% of the entire population) of 1,168 startups and invited them to participate in the research. Our preference was to interview the CEO or the founder who was most involved in the accelerator. A total of 779 founders participated (an acceptable 30.4% response rate comprising 29.9% and 32.8% for men and women, respectively), representing approximately 67% of the startups in the sample (the startups in our sample had 2.2 founders on average).

The main data of this research is based on fully-structured 45-minute interviews with female (*N* = 132, 16.9%) and male (*N* = 647, 83.1%) startup founders who had participated in accelerator programs in Israel. Trained research assistants interviewed founders by telephone. 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 the accelerators’ influence on their entrepreneurial human capital, networks, ESE and confidence, legitimacy, ability to raise capital, and other aspects not relevant to the current research.

**3.2 Measures**

*Pre-entry goals*. Participants were asked to report up to three main goals they had in joining the accelerator. 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 15 predefined goal types[[3]](#footnote-3) (goal types that were not mentioned were coded as 0). The list was developed through a pilot phase that included 60 in-depth open interviews with accelerator managers, mentors, and founders. We use this classification to assess whether female founders are more or less likely than male founders to report goals that correspond to the five barriers to female entrepreneurship discussed above.

The participants often reported gaining entrepreneurial knowledge and skills (i.e., enhancing entrepreneurial human capital), expanding networks, and raising capital among their primary pre-entry goals. They did not, however, report enhancing confidence/self-efficacy or legitimacy as a goal of joining the accelerator, even though these were indicated in the open pilot interviews as significant goals and types of progress sought. Hence, we added specific questions regarding these goals in later interviews, which resulted in fewer observations for these variables. We assessed the goal of increasing entrepreneurial confidence by asking, “How important to you was enhancing your confidence in being able to succeed as an entrepreneur as a pre-entry goal?” We did not assess ESE, which is often measured with multiple items (e.g., Chen et al., 1998) as a pre-entry goal. We made this decision due to practical considerations as we did not want to overburden participants; neither did we expect that novice entrepreneurs would be able to articulate the specific entrepreneurial tasks and skills they hoped to acquire (e.g., assumption validation) before developing a basic knowledge of the field. Such one-item assessments of entrepreneurial confidence have been used previously (e.g., Arenius & Minniti, 2005) and have been interpreted as a proxy for self-efficacy (Tominc & Rebernik, 2007). Participants were also asked, “How important for you was strengthening your legitimacy as an entrepreneur as a pre-entry goal?” 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 affect any gender differences in the ratings.

*Progress during the program*. Respondents were asked to rank their progress during the program on a Likert-type scale 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 was for their success. We calculated a measure that captures 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 multiplied by the importance of the aspect. Thus, this measure approximates the true value the accelerator provided to the founder for those facets in which they feel they made the most progress, and we use it to assess whether female and male founders report making progress during the program in a manner that corresponds to our hypotheses regarding entrepreneurial knowledge and skills, network expansion, and fundraising. Because confidence, ESE, and legitimacy were not spontaneously reported as pre-entry goals, as we explained above, we assessed the impact of the program on these features using specific questions.

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

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

*Control variables*. For secondary and exploratory analyses, we used control variables to examine the residual gender effects on our outcome variables considering those entrepreneurial human capital related variables that might account for gender differences: the founder’s level of education (obtaining a master’s degree or higher prior to the program was coded as 1, otherwise, 0), entrepreneurial experience prior to the program (yes = 1, no = 0), prior accelerator participation experience (yes = 1, no = 0), and whether the founder entered the accelerator with a startup at the idea validation stage (yes = 1, no = 0) or at a more advanced stage. We do not have specific hypotheses regarding these regressions, but we believe that assessing the robustness of the gender effect on the outcome variables could illuminate some of their causes. Descriptions of the control are in Appendix A.

*Additional background variables*. Finally, participants reported their age upon entering the program, and their educational and occupational background prior to the program. We present these variables only in the descriptive statistics.

**3.3 Data Analysis**

We first compared the mean ratings of the background and control variables (see Table 1) to describe the data and examine the differences between women and men in the sample. To test our hypotheses, we applied mean comparisons of our dependent variables (pre-entry goals and progress) by gender. Since some of the variables are not normally distributed, we added Wilcoxon rank-sum tests (WRS; see Table 3). As our hypotheses are directional, *p* values are divided by 2. While some observed gender differences could share the same source (e.g., lack of entrepreneurial experience accounts for the need for both entrepreneurial knowledge and network building), examining them separately is important to understand the value of accelerators, since they cannot change their past source, but only compensate for them in the present, promoting female entrepreneurship through each of them. 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. To explore our rationale that women emphasize access to capital less than men because their needs for basic entrepreneurial knowledge are greater and because their startups are at a less advanced stage, we also examined the mediating role of both variables on fundraising as a goal and on the progress achieved in fundraising.

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

Table 1 presents mean comparisons of the background and control variables by gender. There are a few intriguing differences between the backgrounds of the female and male founders. Female founders were more educated, with 54.5% having at least a master’s degree, compared with 41.3% for male founders. Women were more likely than men to have been educated in the life sciences (16.7% vs. 5.9%) or the social sciences and humanities (22.7% vs. 11.7%), but less likely to have studied in technological fields (e.g., computer, software, and engineering) (25.8% vs. 49.1%). There were no gender differences for advanced degrees in the field of management.

Female founders had fewer years of entrepreneurial work experience (3.5 years for women vs. 5.2 years for men) and less experience in information and communication technology (ICT) domains (40.1% vs. 55.9%) and in R&D positions (33.8% vs. 50.4%), but more experience in social domains (15.2% vs. 4.6%). Regarding experience by type of company, female founders had less experience than male founders in startups (26.5% vs. 44.2%) and multinational corporations (25.0% vs. 34.5%), and more experience in NGOs (12.9% vs. 2.9%) and as self-employed (26.5% vs. 18.2%). Consequently, given their formal education and work experience, female founders were less likely to create startups in the ICT sectors (54.5% vs. 69.7%) but more likely to do so in the life sciences (20.5% vs. 10.0%). Furthermore, Table 1 shows that women tended to enter accelerator programs while their startups were at an earlier stage of development (i.e., idea validation stage) compared with their male counterparts (49.2% vs. 32.9%).

*Insert Table 1 Here*

Tables 2a, 2b, and 2c present correlations between gender, goal variables, progress variables, and control variables.

*Insert Tables 2a, 2b, and 2c Here*

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

**4. RESULTS**

Table 3 shows the results of mean comparisons of the goals and progress variables by gender.

**4.1 Entrepreneurial Human Capital**

Women rated gaining entrepreneurial knowledge and skills (i.e., increasing entrepreneurial human capital) as a significantly higher pre-entry goal than did men, *t*(777) = -3.66, *d* = -.0.349, *p*<0.001, providing support for H1a that female founders join accelerators to increase their entrepreneurial human capital more than do male founders. Women also rated their gains in entrepreneurial knowledge and skills from participating in the program significantly higher than did men, *t*(777) = -3.67, *d* = -0.351, *p* < 0.001, providing support for H1b, that female founders achieve greater improvements in their entrepreneurial human capital than do male founders during the accelerator.

**4.2 Networks**

Women rated expanding their networks as a significantly higher pre-entry goal than did men, *t*(777) = -2.60, *d*= -0.248, *p*=0.005, providing support for H2a that female founders join accelerators to expand their networks more than do male founders. Women also rated their progress in expanding their networks significantly higher than did men, *t*(777) = -2.94, *d* = -0.280, *p* = 0.002; thus, H2b that female founders make more progress than male founders in expanding their networks during the accelerator—is supported

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

Women rated the importance of enhancing their entrepreneurial confidence as a pre-entry goal more highly than did men, *t*(295) = -1.67, *d* = -0.242, *p* = 0.048, consistent with H3a that female founders join accelerators to increase their entrepreneurial confidence and ESE more than male 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 impact of the program on their entrepreneurial confidence significantly higher than men did, *t*(765) = -3.46, *d* = -0.331, *p* < 0.001, and the impact of the program on their ESE significantly higher than men, *t*(763) = -2.74, *d* = -0.266, *p* = 0.003. Together, these findings provide support for H3b that female founders enhance their entrepreneurial confidence and ESE more than male founders do in accelerators.

**4.4 Legitimacy**

Women rated enhancing legitimacy as a significantly higher pre-entry goal than did men, *t*(295) = -1.74, *d* = -0.252, *p* = 0.041, supporting H4a that female founders join accelerators to increase their legitimacy more than male founders do. However, the differences in reported increases in legitimacy were not significant; thus, H4b is not supported.

**4.5 Access to Capital**

We remind the reader that our hypotheses regarding the ability to raise capital were in the opposite direction than the other hypotheses due to the expected earlier stages of both women’s entrepreneurial training and their startups. Table 3 shows that women gave gaining access to capital and fundraising as a pre-entry goal a significantly lower rating than did men, *t*(777) = 1.97, *d* = 0.188, *p* = 0.025, supporting H5a. Women also reported making less progress than men in that respect, although the effect was only marginally significant, *t*(777) = 1.61, *d* = 0.154, *p* = 0.054, therefore, providing partial support for H5b.

*Insert Table 3 here*

**4.6 Regression Analyses**

In Tables 4a and 4b we present the results of the regression analyses for the goal and progress variables, with gender as the independent variable and controlling for having a master’s degree or higher, prior entrepreneurial experience, prior accelerator experience, and whether the founder entered the accelerator with a startup at the idea validation stage. These regressions show whether gender accounts for additional variance once we control for these variables.

We note that these analyses neither undermine nor strengthen our initial hypotheses, as we make no claim regarding any exclusive effect of either gender or the associated background conditions on the predicted gender differences. While the mean comparisons described above examine the different needs and resulting progress of female and male entrepreneurs in accelerators, these regressions do provide some information regarding the sources of these differences.

Overall, gender had a significant residual effect in predicting gaining entrepreneurial knowledge and skills (entrepreneurial human capital), both as a pre-entry goal and in terms of improvement. The gender effect also remained significant for both indicators of network expansion and progress in entrepreneurial confidence and self-efficacy. For all other outcomes, gender did not explain the additional variance in the regressions. Thus, the aggregate gender differences in these outcomes can be explained by gender differences in the background conditions (control variables).

Entering the program with a venture at the idea validation stage was a strong predictor for most outcomes (excluding network goal and 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 and legitimacy, thus explaining the positive significant coefficient. On the other hand, managing a startup at a more mature stage increases the need to gain access to capital and to progress in the fundraising quest. This is expressed in the negative associations between a startup being at the idea validation stage and access to capital indicators. Finally, obtaining a master’s degree or higher, prior entrepreneurial experience, and prior participation in accelerators provide opportunities for gaining entrepreneurial and managerial knowledge, which is expressed in their negative associations with the two indicators of gaining entrepreneurial knowledge.

Finally, our rationale for expecting that women will place less priority on fundraising (5Ha) than men and will make less progress in fundraising (H5b) was based on the assumption that women need more basic training than do men (H1a) because their startups are in earlier stages of development when they enter accelerators. To examine this rationale, we added a second regression for each variable (fundraising as a goal and as a dimension of progress; see models 6 and 14) and the goal of acquiring entrepreneurial knowledge as a control (the idea stage dummy was already a control variable). If our reasoning is valid, we can expect entrepreneurial knowledge and entering the accelerator at the idea stage to attenuate gender effects on these variables. Lastly, a mediation effect analysis of the goal of gaining entrepreneurial knowledge and of the startup stage on fundraising was conducted (see models 7 and 15) to support our argument that gender differences in access to capital as a goal and in terms of progress are a result of these background variables, at least in part.

Including the goal of gaining entrepreneurial knowledge and the idea stage dummy as controls for the regressions predicting fundraising, both as a goal and as progress in fundraising, attenuated the effect of gender, thus, supporting our premise that, in part, women will be less likely to target fundraising and will make less progress in this regard due to their greater need for entrepreneurial knowledge and because they are at an earlier stage of startup development. As further support for our arguments, the goal of gaining entrepreneurial knowledge and the idea stage dummy mediated both the association between gender and the two indicators of fundraising.

**5. DISCUSSION AND CONCLUSIONS**

**5.1 Discussion**

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

We present evidence that during their participation in accelerators, female founders seek and gain more entrepreneurial training than do male founders (*t*(777) = -3.66, *p* < 0.001; *t*(777) = -3.67, *p* < 0.001, respectively); place more emphasis on and succeed more in strengthening their networks (*t*(777) = -2.60, *p* = 0.005; *t*(777) = -2.94, *p* = 0.002, respectively); and place more emphasis on enhancing their entrepreneurial confidence (*t*(295) = -1.67, *p* = 0.048) and improve their confidence more (*t*(765) = -3.46, *p* < 0.001) and ESE (*t*(763) = -2.74, *p* = 0.003).

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

While female founders placed more emphasis on increasing their legitimacy, they did not report more progress in this regard than male founders (although they did report making significantly greater progress than the neutral 0, *t*(83) = 10.88, *p* < 0.001). This finding suggests that female founders’ legitimation barriers are mostly a result of discrimination rather than of a lack of assets and skills; thus, effectively addressing the issue that female founders’ legitimation barriers requires greater cultural changes that go beyond merely improving support systems.

These findings are consistent with known barriers to female entrepreneurship and highlight the potential value of accelerators in addressing them. They also suggest that accelerators that specifically target early-stage startups and provide more early-stage training (such as academic accelerators) may be particularly valuable for female entrepreneurs; thus, supporting such accelerators could be an effective policy in the current effort to advance the scale and impact of women-owned businesses. This also suggests that some female founders should consider beginning with a pre-accelerator program to improve their entrepreneurial human capital and stage of development before they join an accelerator. Doing so may prepare them to advance more in the area of access to capital during the accelerator. The fact that the pre-entry goals of female founders correspond with their hypothesized needs (derived from the known barriers to female entrepreneurship) is important for another reason: it supports our initial underlying assumption that women who decide to launch an entrepreneurial career are aware of the barriers they face.

Additionally, both the initial goal of and progress toward obtaining access to capital received lower ratings from female founders, as we hypothesized (although their progress rating was significantly higher than the neutral 0, *t*(131) = 9.20, *p* < 0.001). We attribute this to the fact that access to capital and fundraising become more feasible once a startup has matured beyond the idea validation stage and that acquiring basic entrepreneurial training precedes improving fundraising skills or opportunities. We further discuss the implications of this finding in the limitations section.

“Finally, controlling for background variables attenuated the effect of gender on some of the outcome variables of confidence/ESE, legitimacy, and access to capital, indicating that gender has an indirect effect on these outcomes. The effect of gender on gaining entrepreneurial knowledge and skills and expanding networks remains robust. This does not necessarily indicate inherent gender differences; rather, these outcomes could be explained by unobserved variables, for example, the quality of a founder’s network prior to entering the accelerator. In any event, even when gender effects are attenuated, the main conclusion holds: accelerators are designed to cater to female entrepreneurs’ needs, regardless of their origins, and thereby support their integration into the entrepreneurial ecosystem.

According to liberal feminist 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 performance are grounded in discrimination, gendered socialization, and unequal access to essential resources and experiences, such as education, relevant work experience, networks, role models, and mentors (Ahl, 2006; Boden and Nucci, 2000; Greene et al., 2001; Fischer et al., 1993). The liberal feminist outlook would suggest that accelerators promote female entrepreneurs not because of their gender, but due to their typical background conditions. According to this viewpoint, women-friendly accelerators (e.g., accelerators that accept and treat female and male founders equally) would be most suitable for women. Drawing on this perspective, some of our conclusions could also be applicable to male founders who start their entrepreneurial career with similar disadvantages and, perhaps more importantly, to founders from underrepresented populations in general.

In contrast, 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 may require different support, design elements, and processes than would men, as they are affected differently by ecosystem factors (Elam et al., 2019). The radical feminist outlook suggests that scholars, as well as decision-makers, should consider these inherent differences and the resulting gender-specific needs when seeking to promote female entrepreneurship. This perspective stresses the importance of designing accelerators specifically for women, bearing in mind these inherent differences. This question is relevant to the current debate on the advantages and disadvantages of women-focused accelerators compared with women-friendly accelerators (Brush & Elam, 2021). Although our data cannot fully resolve this dispute, it does suggest viable directions for future research.”

* 1. **Limitations**

Some limitations should be noted in interpreting our results. First, a large part of the data could be biased because it was self-reported by the founders. For example, gender differences in social desirability may have led women to provide inflated ratings (e.g., Dalton & Ortegren, 2011). However, out of 15 pre-entry goals and reported areas of progress in our data, seven did not yield significant gender differences. When gender differences were observed, they were mostly consistent with our hypotheses, and those differences for which we had no hypotheses were split between women (two goals and two improvements) and men (one goal and two improvements). Moreover, the fact that some gender effects were not significant after controlling for background variables should also 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, it could be argued that this is precisely because accelerators provide the kind of help that female founders need. Women tend to seek help more than men do in different contexts (Bamberger, 2009), and this tendency might induce them to seek the help of accelerators regardless of the specific type of help these provide. Additionally, we do not have data about applications to accelerators by gender, so the relative increase in women’s participation in accelerators could simply be attributed to gender-related acceptance rates rather than gender-related application rates. However, neither of these explanations for the higher proportion of women in accelerators negates our premise that accelerators’ design caters to the specific needs of female entrepreneurs or our findings that female founders require and advance more than men in most of these aspects. It should be emphasized that the observed high proportion of women in accelerators merely triggered our research, but it accounts for none of the empirical results or conclusions.

Third, our data suggest that women advance less than men in their access to capital and in fundraising. Although this finding is consistent with our predictions and with previous findings (Chen, 2019; Dutt & Kaplan, 2020), it may undermine our suggestion that accelerators promote female founders more than male founders (although female founders do advance on this aspect as well), 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 help close the entrepreneurial gender gap. However, we believe that there are some factors that counter such concerns. We posit that the finding that women advance less in access to capital is in part the product of the first barrier (entrepreneurial human capital) and due to the stage 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 effect on the actual fundraising efforts of female founders will only be evident 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 female founders in our sample tended to be at a more preliminary stage (i.e., idea validation) than those of male founders (*r* = -0.13, *p* < 0.001). If a venture is at a more preliminary stage, and its founder is still building his or her basic entrepreneurial skills, it follows that fundraising will be less of a priority. Targeting access to capital as a goal negatively correlated with both a startup being at the idea validation stage (*r* = -0.15, *p* < 0.001) and with targeting entrepreneurial human capital (*r* = -0.21, *p* < 0.001). Second, our regressions (models 5, 6, 13, and 14) did not indicate that gender has a unique effect on fundraising, either as a pre-entry goal or as an aspect of improvement, but rather that it has an indirect effect through the goal of gaining entrepreneurial human capital and advancing the startup stage (models 7 and 15). This suggests that gender differences in access to capital are a result of background conditions and not of gender per se, which is consistent with Elam et al.’s (2019) suggestion that women’s limited access to capital could be a symptom of other factors (e.g., the barriers we described). Together, these results support the argument that, in the long run, accelerators probably advance female founders’ access to capital as much as they do male founders. Our findings suggest that targeting short-term effects on fundraising, as was done in previous research, likely misses much of the value that 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 barriers female entrepreneurs around the world face are similar to those faced by Israeli female entrepreneurs. Thus, it is quite possible that accelerators in other ecosystems similarly address these obstacles and have a comparable impact on female founders.

* 1. **Conclusions**

Women are substantially underrepresented in entrepreneurship 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 has important consequences for economic growth, financial independence, equality, and innovation (Hechavarría et al., 2019; Kelley et al., 2017). This study addressed this issue by focusing on the role of startup accelerators (where female participation is noticeably higher than in the startup ecosystem) in supporting female entrepreneurship. We described five barriers to female entrepreneurship identified in the literature: low levels of entrepreneurial human capital, limited networks, low levels of ESE and confidence; low legitimacy in the entrepreneurial ecosystem; and limited access to capital. We suggest that minimizing these barriers should decrease the gender participation gap in entrepreneurship. We examined our premises within the Israeli entrepreneurial ecosystem, which is among the world’s leading and most influential entrepreneurial ecosystems (Compass, 2019).

We examined the specific types of support that accelerators provide—entrepreneurial training, network extension, intensive mentoring, legitimation signaling entity, and fundraising support and training 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 obstacles, the impact of accelerators on female founders was stronger than on male founders. The impact on the remaining two barriers was also positive for female founders, although not greater than the influence in the case of male founders. 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 value that accelerators provide to female founders. Additional lines of research should extend our findings in five directions. First, future research should use measures other than self-reporting, such as objective data or ratings of program managers and mentors. Second, it is advisable to use objective and long-term performance measures (including fundraising measures) in a longitudinal design to support the premise that accelerators not only encourage female participation in entrepreneurship but also promote their ultimate success. Third, evidence should be collected from different entrepreneurial ecosystems to increase the external validity of our findings. Fourth, our hypotheses should be tested in different types of accelerators to assess to what extent our results can be generalized to the entire class of accelerators, or whether they are limited to specific types of accelerators. Examining different types of accelerators with different designs and goals will lead to better insights into the specific elements that are most crucial for enhancing female entrepreneurship and will strengthen our policy implications. Fifth, more research should focus on the role of and differences between women-dedicated and women-friendly accelerators and pre-accelerators in promoting female entrepreneurship and decreasing the gender gap in entrepreneurship.

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Female** | | **Male** | |  |
| **Variable** | **Mean (SD)** | **N** | **Mean (SD)** | **N** | **t value** |
| **Founder Age** | 36.4 (8.48) | 132 | 38.2 (10.1) | 647 | 1.88† |
| **A. Education** (%) | | | | | |
| **Master’s degree** | 54.5 (50.0) | 132 | 41.3 (49.3) | 647 | -2.82\*\* |
| **Technology** | 25.8 (49.3) | 132 | 49.1 (50.0) | 647 | 4.99\*\*\* |
| **Management** | 32.6 (47.0) | 132 | 36.9 (48.3) | 647 | .950 |
| **Life Sciences** | 16.7 (37.4) | 132 | 5.9 (23.5) | 647 | -4.28\*\*\* |
| **Humanities & Social** | 22.7 (48.3) | 132 | 11.7 (31.9) | 647 | -3.37\*\*\* |
| **B. Accelerator Pre-Entry Work Experience (%)** | | | | | |
| **R&D** | 31.8 (46.8) | 132 | 50.4 (50.0) | 647 | 3.93\*\*\* |
| **ICT** | 40.1 (49.2) | 132 | 55.9 (49.7) | 647 | 3.34\*\* |
| **Social domain** | 15.2 (36.0) | 132 | 4.6 (21.0) | 647 | -4.55\*\*\* |
| **Entrepreneurial exp.** | 75.0 (43.5) | 132 | 73.9 (44.0) | 647 | -.267 |
| **Self-employed** | 26.5 (44.3) | 132 | 18.2 (38.6) | 647 | -2.19\* |
| **Startup experience** | 26.5 (44.3) | 132 | 44.2 (49.7) | 647 | 3.79\*\*\* |
| **MNC** | 25.0 (43.5) | 132 | 34.5 (47.6) | 647 | 2.11\* |
| **NGO** | 12.9 (33.6) | 132 | 2.9 (16.9) | 647 | -5.03\*\*\* |
| **Previous accelerator** | 19.7 (39.9) | 132 | 20.1 (40.1) | 647 | .103 |
| **C. Startup Characteristics at Entry (%)** | | | | | |
| **Sector ICT** | 54.5 (50.0) | 132 | 69.7 (46.0) | 647 | 3.40\*\*\* |
| **Sector Life Sciences** | 20.5 (40.5) | 132 | 10.0 (30.1) | 647 | -3.40\*\*\* |
| **Stage: Idea** | 49.2 (40.6) | 132 | 32.9 (29.3) | 647 | -3.59\*\*\* |
| **Stage: PMF** | 31.1 (46.5) | 132 | 39.3 (48.9) | 647 | 1.77 |
| **Stage: Scale** | 19.7 (39.9) | 132 | 27.7 (44.8) | 647 | 1.90† |

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

Table 2a: *PW Correlation Matrix: goals and control variables*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | Female | (1) | (2) | (3) | (4) | (5) |
| (1) Knowledge | .13\*\*\* | 1.00 |  |  |  |  |
| (2) Network | .09\*\* | .03 | 1.00 |  |  |  |
| (3) Confidence | .10† | .23\*\*\* | .11† | 1.00 |  |  |
| (4) Legitimacy | .10† | .11† | .16\*\* | .69\*\*\* | 1.00 |  |
| (5) Fundraising | -.07\* | -21\*\*\* | -.07† | -.01 | .04 | 1.00 |
| Founder age | -.07† | -.09\* | -.03 | -.09 | -.11† | .03 |
| Prev. accelerator | -.01 | -.20\*\*\* | .05 | -.10† | -.09 | .06 |
| Master’s degree | .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 2b: *PW Correlation Matrix: areas of progress and control variables*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | Female | (1) | (2) | (3) | (4) | (5) | (6) |
| (1) Knowledge | .13\*\*\* | 1.00 |  |  |  |  |  |
| (2) Network | .10\*\* | .09\*\* | 1.00 |  |  |  |  |
| (3) Confidence | .12\*\*\* | .18\*\*\* | .08\* | 1.00 |  |  |  |
| (4) ESE | .10\*\* | .21\*\*\* | .10\*\* | .37\*\*\* | 1.00 |  |  |
| (5) Legitimacy | -.01 | .13\*\* | .01 | .44\*\*\* | .36\*\*\* | 1.00 |  |
| (6) Fundraising | -.06 | -.15\*\*\* | .01 | .04 | -.04 | .05 | 1.00 |
| Founder age | -.07† | -.06† | -.02 | -.17\*\*\* | -.08\* | -.07 | -.03 |
| Prev. accelerator | -.004 | -.20\*\*\* | -.008 | -.04 | -.10† | -.02 | .05 |
| Master’s degree | .10\*\* | -.09\* | -.02 | -.09\* | -.07† | -.07 | -.02 |
| Entrepreneurial 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 2c: *PW Correlation Matrix: control variables*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | (1) | (2) | (3) | (4) | (5) | (6) |
| (1) Female | 1.00 |  |  |  |  |  |
| (2) Founder age | -.07† | 1.00 |  |  |  |  |
| (3) Previous accelerator | -.004 | -11\*\* | 1.00 |  |  |  |
| (4) Master’s degree | .10\*\* | .21\*\*\* | .03 | 1.00 |  |  |
| (5) Entrepreneurial 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 3:** *Goals and progress: t tests and Wilcoxon rank sum tests (female = 1, male = 0)*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **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; Confidence and Legitimacy scale: 1–5)** | | | | | | | |
| **Knowledge** | 1.71 (2.21) | 132 | 1.05 (1.81) | 647 | -3.66\*\*\* | -.349 | <.001 |
| **Network** | 1.58 (2.12) | 132 | 1.12 (1.79) | 647 | -2.60\*\* | -.248 | .001 |
| **Confidence** | 2.93 (1.54) | 60 | 2.57 (1.52) | 237 | -1.67\* | -.242 | .050 |
| **Legitimacy** | 2.82 (1.63) | 60 | 2.43 (1.53) | 237 | -1.74\* | -.252 | .042 |
| **Fundraising** | 1.66 (2.07) | 647 | 2.08 (2.22) | 132 | 1.97\* | .188 | .001 |
| **B. Founders’ Progress Level (scale 0–5; Confidence and Legitimacy scale: -3 to +3) during the accelerator** | | | | | | | |
| **Knowledge** | 1.88 (1.50) | 132 | 1.20 (1.06) | 647 | -3.67\*\*\* | -.351 | <.001 |
| **Network** | 1.90 (2.14) | 132 | 1.36 (1.86) | 647 | -2.94\*\* | -.280 | .002 |
| **Confidence** | 1.79 (1.26) | 132 | 1.34 (1.35) | 635 | -3.46\*\*\* | -.331 | <.001 |
| **ESE** | 3.04 (0.96) | 129 | 2.78 (1.00) | 623 | -2.74\*\* | -.266 | .012 |
| **Legitimacy** | 1.24 (1.04) | 84 | 1.27 (0.96) | 368 | .316 | .038 | .845 |
| **Fundraising** | 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 directional hypotheses, thus, we display one-sided p values.

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

**Table 4a:** *OLS Regressions‑Dependent variables: Founders’ goals prior to entry*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Model | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| DV | EHC\_Goal | Net\_Goal | ESC\_Goal | Legit\_Goal | Raise\_Goal | Raise\_Goal | Raise\_Goal |
| Female | .582\*\*  (.151) | .443\*  (.178) | .305  (.218) | .364  (.224) | -.308  (.210) | -.182  (.209) | -.182  (.208) |
| Master’s degree | -.404\*\*  (.131) | -.114  (.134) | .040  (.181) | -.172  (.186) | -.002  (.158) | -.085  (.157) | -.085  (.156) |
| Entrep. exp. | -.263†  (.147) | -.405\*\*  (.151) | -.299  (.196) | -.245  (.201) | -.316†  (.178) | -.373\*  (.176) | -.373\*  (.175) |
| Prev. accelerator | -.700\*\*\*  (.165) | .330†  (.169) | -.285  (.274) | -.272  (.281) | .148  (.200) | .002  (.199) | .002  (.198) |
| Stage: idea | .786\*\*\*  (.139) | .223  (.143) | .647\*\*\*  (.179) | .550\*\*  (.184) | -.618\*\*\*  (.169) | -.448\*\*  (.169) | -.448\*\*  (.169) |
| Confidence Goal | - | - | - | - | - | -.216\*\*\*  (.043) | -.216\*\*\*  (.043) |
| Female  (->Stage) |  |  |  |  |  |  | -.072\*  (.034) |
| Female  (->Knowledge) |  |  |  |  |  |  | -.142\*\*  (.048) |
| Constant | 1.26\*\*\*  (.151) | 1.33\*\*\*  (.155) | 2.49\*\*\*  (.213) | 2.43\*\*\*  (.219) | 2.48\*\*\*  (.183) | 2.76\*\*\*  (.189) |  |
| F value | 19.02 | 4.03 | 4.72 | 3.92 | 4.59 | 8.16 |  |
| P value | .0000 | .0013 | .0004 | .0019 | .0004 | .0000 |  |
| R2 (adj.) | .1038 | .0191 | .0591 | .0470 | .0226 | .0523 |  |
| N | 779 | 779 | 297 | 297 | 779 | 779 |  |

Standard errors are reported in parentheses.

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

**Table 4b:** *OLS Regressions—Dependent variables: Founders’ progresses*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| DV | EHC\_P | Net\_P | ESC\_P | ESE\_P | Legit\_P | Raise\_P | Raise\_P | Raise\_P |
| Female | .577\*\*\*  (.178) | .530\*\*  (.185) | .438\*\*\*  (.129) | .223\*  (.097) | -.057  (.119) | -.192  (.181) | -.105  (.180) | -.105  (.179) |
| Master’s degree | -.338\*  (.134) | -.086  (.139) | -.272\*\*  (.098) | -.159\*  (.073) | -.133  (.094) | -.065  (.136) | -.125  (.135) | -.125  (.135) |
| Entrep. exp. | -.357\*  (.151) | -.371\*  (.156) | -.219\*  (.110) | .033  (.083) | .105  (.108) | -.189  (.152) | -.228  (.152) | -.228  (.151) |
| Prev. accelerator | -.688\*\*\*  (.169) | .087  (.176) | -.027  (.123) | -.143  (.094) | -.013  (.131) | .109  (.172) | -.006  (.172) | -.006  (.171) |
| Stage: idea | .907\*\*\*  (.143) | .135  (.148) | .296\*\*  (.103) | .393\*\*\*  (.086) | .191\*  (.096) | -.529\*\*\*  (.145) | -.412\*\*  (.146) | -.412\*\*  (.146) |
| Knowledge Goal | - | - | - | - | - | - | -.148\*\*\*  (.037) | -.148\*\*\*  (.037) |
| Female  (->Stage) | - | - | - | - | - | - | - | -.067\*  (.030) |
| Female  (->Knowledge) | - | - | - | - | - | - | - | -.097\*\*  (.036) |
| Constant | 1.44\*\*\*  (.155) | 1.61\*\*\*  (.161) | 1.52\*\*\*  (.113) | 2.71\*\*\*  (.086) | 1.17\*\*\*  (.112) | 2.08\*\*\*  (.157) | 2.28\*\*\*  (.163) | 2.28\*\*\*  (.163) |
| F-value | 20.63 | 3.17 | 6.90 | 9.36 | 1.45 | 3.98 | 6.05 |  |
| p-value | .0000 | .0076 | .0000 | .0000 | .2045 | .0014 | .0000 | .0000 |
| R2 (adj.) | .1120 | .0201 | .0371 | .0527 | .0050 | .0188 | .0375 | .0421 |
| N | 779 | 779 | 767 | 752 | 452 | 779 | 779 | 779 |

Standard errors are reported in parentheses.

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

**Appendix A**

Table A1: *Description of goals and progress variables*

|  |  |
| --- | --- |
| Knowledge Goal | How critical was the goal of gaining entrepreneurial knowledge (on a scale of 1–5) and 0 if it was not a goal |
| Network Goal | How critical was the goal of expanding networks (on a scale of 1–5) and 0 if it was not a goal |
| Confidence Goal | How critical was the goal of enhancing entrepreneurial confidence on a scale of 1–5 (this was a direct question; thus, it was always mentioned – no 0) |
| Legitimacy Goal | How critical was the goal of enhancing entrepreneurial legitimacy on a scale of 1–5 (this was a direct question; thus, it was always mentioned – no 0) |
| Fundraising Goal | How critical was the goal of gaining access to capital (on a scale of 1–5) and 0 if it was not a goal |
| Knowledge Progress | Progress level in entrepreneurial knowledge and skills during the accelerator program (on a scale of 0–5) |
| Network Progress | Progress level in expanding networks during the accelerator program (on a scale of 0–5) |
| Confidence Progress | Level of change in entrepreneurial confidence during the accelerator program (on a scale of -3 to +3) |
| ESE Progress | Level of change in entrepreneurial self-efficacy during the accelerator program (on a scale of 1–5) |
| Legitimacy Progress | Level of change in entrepreneurial legitimacy during the accelerator program (on a scale of -3 to +3) |
| Fundraising Progress | 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, 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 exposure, and 15) Joining an entrepreneurial community.

Table A2: *Description of background and control variables*

|  |  |
| --- | --- |
| **Variable name** | **Variable description** |
| Female | 1 for female founder and 0 for male founder |
| Founder Age | Founder’s age when entered the accelerator |
| Master’s degree | 1 if the founder has at least a second degree, otherwise 0 |
| Edu: Technology | 1 if the founder has a degree in technology, otherwise 0 |
| Edu: Management | 1 if the founder has a degree in management, otherwise 0 |
| Edu: Life sciences | 1 if the founder has a degree in the life sciences, otherwise 0 |
| Edu: Humanities & Social | 1 if the founder has a degree in the humanities or social sciences, otherwise 0 |
| 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 had 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 |
| Prev. accelerator | 1 if the founder had 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: PMF | 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 |

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. Pitching skills are important for attracting investors’ initial interest (Balachandra et al., 2019). [↑](#footnote-ref-2)
3. The 15 pre-entry goals and progress variables that we collected included: 1) Gaining entrepreneurial knowledge and skills; 2) Expanding networks; 3) Enhancing entrepreneurial confidence/ESE; 4) Gaining legitimacy; 5) Fundraising; 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-3)