In it together

How peers and mentors connect and influence entrepreneurs

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Publication date
2023

Document Version
Final published version

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HOW PEERS AND MENTORS CONNECT AND INFLUENCE ENTREPRENEURS

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In It Together:
How Peers and Mentors Connect and Influence Entrepreneurs

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad van doctor
aan de Universiteit van Amsterdam
op gezag van de Rector Magnificus
prof. dr. ir. P.P.C.C. Verbeek
ten overstaan van een door het College voor Promoties ingestelde commissie,
in het openbaar te verdedigen in de Agnietenkapel
op vrijdag 2 juni 2023, te 13.00 uur

door Kai Becker
geboren te Eisenhuettenstadt

Promotiecommissie

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Faculteit Economie en Bedrijfskunde

Cover: Jessica Danielle Smith (Revived and Digital)
Lay-out: Kai Becker

Acknowledgements

I would like to express my deepest gratitude to all of those who have supported me throughout my journey in completing this dissertation. While I am unable to mention every individual who has contributed to my progress, I would like to extend my particular appreciation to my supervisors as well as my friends inside and outside academia who have fueled my motivation and provided me with insight and true inspiration. Thank you!

First and foremost, I would like to thank my supervisors Joris and Yuval for their unwavering support and guidance. You have been true mentors to me. Joris, your structure and direction helped me navigate the academic world. Without you, I would have never pursued this career. Yuval, your understanding, and availability were invaluable. Thank you for grasping what I was thinking, not what I was saying.

I would also like to thank my close friends Daniel, Jessie, Florian, and Quixote (i.e., a cat). In your own special way, each one of you has allowed me to vent my complaints, share my frustrations and provided much needed entertainment. My colleagues and co-students inside and outside the business school have also played a crucial role in my journey. Dan, Cecilia, Ari, Matheo, and Caroline you are role models to me. Without you, conferences, workshops, and summer schools would have been a rather boring affair. With you, they were not.

Lastly, I would like to extend my appreciation to my friends at *Caffenation* for providing me with my vice, caffeine. The chats and distractions provided by the café were a welcome escape during the writing process, and for letting me be when I needed it the most. Thank you all for your support.

Amsterdam, 23rd of February 2023

Financial Support

The research for/publication of this doctoral thesis received financial assistance from IXA / IXANext.

Table of Contents

List of Figures

List of Tables

List of Abbreviations

CEO ..... Chief Executive Officer
DV ..... Dependent Variable
HLM ..... Hierarchical Linear Modeling
IPO ..... Initial Public Offering
IT ..... Information Technology
IXA ..... Innovation Exchange Amsterdam
MIT ..... Massachusetts Institute of Technology
PhD ..... Doctor of Philosophy
SDT ..... Self-Determination Theory
SET ..... Social Exchange Theory
SIENA ..... Simulation Investigation for Empirical Network Analysis
SOAM ..... Stochastic Actor-Oriented Model
US ..... United States
VC ..... Venture Capital

— CHAPTER 1 —

Introduction

Introduction

> *"One of the common misconceptions is that the number one value that Y Combinator founders would get from the program is interacting with their group partners {expert accelerator staff offering education} (…). However, what I would say is that there is so much more value being part of the community. And, there is really two bits to that: One, there is this group of founders in your batch who are all pushing towards growing their companies, making their companies better. When you are with a bunch of smart, competitive, nice people, you kind of want to work harder and so that is a big impact. And the second is the access to program alumni. There are over 9.000 people who have completed the Y Combinator program now. Our alumni base is massive."* Michael Seibel (Managing Director of Y Combinator) – (Mascarenhas & Wilhelm, 2022, 06:37)

Entrepreneurship is vital for job creation, innovation, and economic growth (Hitt et al., 2011; Schumpeter, 1950). Therefore, understanding how founders[1] recognize and exploit entrepreneurial opportunities is important to anyone supporting and benefiting from entrepreneurship, including policymakers, educators, investors, current, and aspiring founders (McMullen & Dimov, 2013; Shane & Venkataraman, 2000). A recent support phenomenon, that is increasingly becoming a central part of entrepreneurial ecosystems, are startup accelerators (Cohen, Fehder et al., 2019). For example, 33% of US startups that received series A funding in 2015 had been through such an entrepreneurship program (Teare, 2021; Tom, 2016). By definition, accelerators are short-term cohort-based entrepreneurship programs that take equity in exchange for seed capital and intensive education (Cohen & Hochberg, 2014). Upon acceptance, startups selected into Y Combinator – the first and one of the most prestigious accelerator programs in the world – for example, receive $500.000 in seed funding to enable founders to spend several months completely focused on their startup with no distraction other than the complementary program elements including expert sessions, workshops, pitch trainings, and guest speakers (Nathoo, 2022). Taken together, it seems therefore intuitively obvious to attribute

[1] Throughout this dissertation, I will use the terms founder and entrepreneur interchangeably.

the success of program alumni such as *Dropbox*, *Stripe*, *Reddit*, and *Coinbase* to the intensive formal education and funding provided by these programs.

However, as the introductory quote by the managing director of Y Combinator suggests, these explanations are incomplete. Instead, the main source of value for participating founders comes in the form of access to program alumni and cohort peers. This is consistent with a large body of research on mentoring in corporate settings, which encompasses support from senior and more seasoned individuals – mentors – who have faced similar experiences in the past and hold higher positions in the organizational structure (Allen et al., 2004; Haggard et al., 2011; Kram, 1985) and guidance from individuals who are currently at comparable levels within the organization – i.e., peers (e.g., Higgins & Kram, 2001; Kram & Isabella, 1985; McManus & Russel, 2007). Both mentors and peers provide tremendous value through two categories of support: *Psychosocial support* (e.g., guidance on managing stress, building self-confidence, and developing healthy relationships) and *development support* (e.g., helping identify and pursue career opportunities, giving feedback on job performance, and providing access to industry networks) (Kram, 1985).

Like mentors and peers in corporate settings, alumni but also other knowledgeable experts drawn upon to support startup founders (henceforth: startup mentors) and cohort peers, are a valuable resource for founders (Cohen, Bingham et al., 2019; Pauwels et al., 2016). They pose a vital source of information and knowledge because they have made similar experiences and provide emotional support, role modeling, and inspiration (Hallen et al., 2020; Ozgen & Baron, 2007; St-Jean, 2011). As a result, startup mentoring and support from cohort peers have been shown to be a significant source of learning, compensating for a lack of entrepreneurial experience (Assenova, 2020), building competence (Baluku et al., 2020), increasing

entrepreneurial self-efficacy (St-Jean & Tremblay, 2020), and helping founders persist and stay motivated (St-Jean & Audet, 2009). The value that startup mentors and cohort peers bring is therefore invaluable in supporting the success of startups (Cohen, Bingham et al., 2019).

While the studies cited above highlight the role of startup mentoring and support from cohort peers on entrepreneurial performance (or antecedents thereof), the role of social networks as conduit to these benefits has largely been ignored (e.g., Hansen, 1999; Ulhøi, 2005; Zaheer & Soda, 2009). For example, Scott et al. (2020) show that startup mentors are incredibly selective, preferring to support only about four percent of all founders, while Hallen et al. (2020: 397) emphasize that learning "via peer networks occurs via the social connections of entrepreneurs to other entrepreneurs." To date, however, extant theory does not adequately explain who startup mentors are, along with how they form connections with focal founders to unfold their positive influence. Nor does theory fully explicate the mechanisms that may enable founders to better access valuable peer support.

For example, consider evidence showing that collaborative workspaces, such as those afforded by accelerators, expose founders to hundreds of mentors (Cohen, Fehder et al., 2019) and encourage extensive contact between cohort peers (Cohen, Bingham et al., 2019). It seems reasonable to attribute emerging social connections to proximity and exposure alone (e.g., Festinger et al., 1950; Gieryn, 2000). After all, if participating founders dedicate most of their time working on their startups (Cohen & Hochberg, 2014), physical closeness can facilitate encounters and be predictive of whom founders connect with socially (Catalini, 2017; Roche et al., 2022). Yet, there is less research on what precisely makes startup mentors and cohort peers connect with certain founders and not others – despite being equally close in space. Finally, the specific benefits and outcomes of these connections remain a puzzling issue that research has yet

to unravel in more detail. Because whom startup mentors and cohort peers connect with impacts what resources founders and their startups can leverage for their entrepreneurial efforts (Aldrich & Zimmer, 1986; Hallen et al., 2020), these are important questions to consider.

In my dissertation, I aim to gain a deeper understanding of how the connections between mentors, peers, and founders in accelerators emerge, and how they influence founders once a connection exists. I conduct four studies – representing Chapters 2 to 5 – using various methods to examine this topic: First, a conceptual analysis that seeks to develop new theoretical perspectives on startup mentoring. Second, a metric conjoint experiment examining contingencies of startup mentors' willingness to mentor. Third, a social network analysis that examines the evolution of peer networks in a startup accelerator. Fourth, and last, a simulation-based social network analysis that models the interplay of entrepreneurial passion and peer networks in a startup accelerator. In the remainder of this introduction, I will provide an overview of the most relevant concepts to position my dissertation within the current discourse of entrepreneurship research, outline the specific research questions addressed, and summarize the four chapters that investigate them.

Conceptual Background and Research Problems

The general aim of this thesis is to better understand how social connections between startup founders and their mentors and peers serve as conduits to the resources that these relationships can provide. Although neither mentoring nor peer support are exclusive to accelerator programs (e.g., Collewaert et al., 2016; Zuckerman & Sgourev, 2006), I draw on these programs as a primary context for my analyses because they provide a valuable "window into early stage entrepreneurship" (Cohen, Fehder et al., 2019: 1783).

Since the foundation of the first accelerator, Y Combinator, in 2005, accelerators have "gone global", becoming a rapidly growing entrepreneurship phenomenon (Cohen, Fehder et al., 2019; Hallen et al., 2020). Although these short-term entrepreneurship programs provide a range of services including formal education, office space, and access to funding to help participating founders accelerate their startup's growth (e.g., Bliemel et al., 2021; Cohen & Hochberg, 2014; Hallen et al., 2020), two key sources of value are notable. First, participating founders are exposed to, and form mentorships, with an array of individuals including entrepreneurs (e.g., alumni), investors, advisors, and industry experts. Second, accelerators provide a rich social peer environment for founders to actively exchange knowledge and experience and collaborate to overcome challenges associated with startup formation (e.g., Cohen, Bingham et al., 2019; Krishnan et al., 2020).

Starting with the first, the term *mentoring* originates in Homer's Odyssey in which Odysseus entrusts the education and guidance of his son Telemachus to his friend, Mentor. Through Mentor's wisdom and guidance, Telemachus is able to navigate the challenges he faces and develop into a responsible and capable adult (Homer & Fagles, 1996). Similarly, "mentoring" has been adopted and utilized across various settings including corporate organizations, academia, and youth organizations loosely describing the relationship between a more experienced individual, known as a mentor, and a less experienced individual, known as a mentee (Eby et al., 2008; Haggard et al., 2011; Kram, 1985). More recently, mentoring has also found inroads into entrepreneurship research. Here, mentoring is being positioned as the facilitated relationship between a novice and a more experienced founder – or an expert with otherwise relevant experience (e.g., Assenova, 2020; Cohen, Fehder et al., 2019).

However, it is important to note the differences between corporate mentoring and startup mentoring. In startup mentoring, the mentee is not a junior within the mentor's organization, but rather a fellow entrepreneur at the top of her organizational hierarchy. In addition, mentors are external to their mentees' startups meaning they can neither rely on their advanced organizational position to offer "protection" nor gain reputational benefits from successful mentees indicating different resources and rewards for mentors (Sanchez-Burks et al., 2017; Waters et al., 2002). Finally, startup mentorships are often formally arranged and bound by the programs they unfold in (Assenova, 2020; Bisk, 2002). This may raise concerns about the effectiveness of the mentoring relationship, as shorter and more ad-hoc sessions may not be sufficient for meaningful relationship development (Bliemel et al., 2021). In order to address these differences, and to provide a solid conceptual foundation for the subsequent chapter, the first objective of this dissertation is to investigate the following research questions in Chapter 2:

To what extent is startup mentoring different from mentoring in corporate settings, and by which processes does it generate value to mentees?

Furthermore, recognizing the valuable benefits that startup mentoring can provide to participating founders, accelerators have made mentoring a core service and invest significant resources into building and maintaining diverse mentor networks (Cohen & Hochberg, 2014; Hallen et al., 2020). While prestigious accelerators may provide founders with access to hundreds of mentors to choose from (Cohen, Fehder et al., 2019), mentors are a scarce resource in entrepreneurial ecosystems more broadly (Bliemel et al., 2019). Additionally, the knowledge and experience required by founders from their mentors is unique to the mentors' experiences

(Bliemel et al., 2021) and mentors have different motivations, including a desire to give back, obtaining recognition, or even using mentoring as an investment vehicle (Bliemel et al., 2021; Sanchez-Burks et al., 2017). This makes the question of a good match between mentors and mentees increasingly relevant. To address this question, I have designed an empirical study exploring the preferences of mentors. Through this study, I aim to answer the following research questions in Chapter 3:

> *How do mentee competence and relationship quality indicators affect mentors' willingness to mentor, and how is this relationship affected by different mentoring motivations?*

In addition to startup mentors, founders are exposed to peers – founders of participating startups from the same accelerator cohort – who are going through similar challenges in real-time, making them a valuable source of information and benchmarking (Cohen, 2013; Cohen, Bingham et al., 2019). Ample research to date has shown the benefits of peer entrepreneurship more generally (e.g., Cai & Szeidl, 2018; Lerner & Malmendier, 2013; Zuckerman & Sgourev, 2006). For example, Cai and Szeidl (2018) find that regular meetings among industry peers lead to increased trust and a willingness to share critical business contacts to customers and suppliers. Within entrepreneurship programs more specifically, Hasan and Koning (2019) show that a team's project performance is positively related to the performance of co-located individuals with whom new social connections are formed. Similarly, Roche et al. (2022) find that startups located in co-working spaces are more likely to adopt technologies used by their peers, but that this effect decreases with physical distance. Finally, Cohen, Bingham et al. (2019) uncover important interactions between design choices of accelerators and conducive peer processes.

Specifically, public pitches, progress updates and open workspaces increase the exchange of vital information among participating founders, offer opportunity for founders to compare and push harder, and ultimate increases startup performance. Studies such as these suggest that the benefits peers can provide depend on actual social interaction and the formation of social connections (Catalini, 2017). These social connections can act as conduits for the transmission of private information, advice, and access to resources that may otherwise be unobtainable or expensive and, in turn, influence the behavior of other individuals in the peer network (Coleman, 1988; Granovetter, 1973).

To depict these social networks among peer entrepreneurs, and to illustrate their evolution, I designed two empirical studies that employ a network perspective. According to social network theory, networks can be understood as a group of actors[2] that are connected by relationships to create a specific social structure (Borgatti & Halgin, 2011). Key concepts expressing such network structure are network density, reach, and clustering. First, network density refers to the proportion of actual connections – called ties – relative to the total number of connections that could exist within the network. A dense network is one where most actors are tied to each other, while a sparse network is one where there are few ties. Second, network reach reflects the proportion of the network that is reachable within a certain number of steps and is useful to understand how information or influence propagates through social networks. Reach reflects degrees of separation between actors with $k = 1$ step being a direct connection, $k = 2$ steps a connection of a direct connection and so on (Borgatti et al., 2013; Everett & Borgatti, 1999). Finally, clustering identifies groups of actors within a network who are densely connected to one another, and less connected to those outside the group. Clustering is relevant because it

[2] "Actors" can be individual persons, but also teams, organizations, countries, and so on.

can indicate the formation of subgroups or communities within a network, which can have implications for the spread of information or influence within the network (Borgatti et al., 2013; Everett & Borgatti, 1999).

Furthermore, networks can be characterized not only by their structure, but also by their evolution over time (Greve & Salaff, 2003). After all, by organizing an array of social events including workshops, guest speakers, and cohort dinners, accelerators specifically aim to stimulate the formation of a broader peer network (van Rijnsoever, 2020). An important factor that influences the development of social networks is therefore the tendency for people to associate with those who are nearby (e.g., Bornstein, 1989; Festinger et al., 1950; Gieryn, 2000). This is based on the idea that if individuals are physically close to each other – such as those participating in in-person accelerator programs (Cohen, 2013) – they are more likely to encounter each other and form social ties (Catalini, 2017; Roche et al., 2022).

However, the outbreak of COVID-19 drastically changed this dynamic. In order to curb infection rates and ease the burden on healthcare systems, governments implemented policies such as social distancing and remote work, leading to a shift towards mostly staying at home (Numella et al., 2020). As a result, in-person accelerator programs moved online, requiring founders to rely on digital technologies (e.g., Slack, Zoom) to overcome the constraints of lacking physical co-location (Smith et al., 2017; von Briel et al., 2018). In Chapter 4, I take advantage of this opportunity by comparing longitudinal network data from the same accelerator program pre-COVID-19 with data from the program after it shifted online. Through this comparison, I aim to explore the connections between program design and network connectivity, thereby integrating previously separate research on online entrepreneurship programs (e.g.,

Grimaldi & Grandi, 2005; von Zedtwitz & Grimaldi, 2006) and expanding our understanding of startup accelerators (e.g., Cohen & Hochberg, 2014; Cohen, Bingham et al., 2019). I examine:

> *How does the transition from an offline to an online accelerator program affect social network connectivity among peer entrepreneurs?*

Finally, social network analysis is generally concerned with how actors are related to each other (Borgatti et al., 2013), and how these relationships evolve over time (Greve & Salaff, 2003). However, more recent advances in social network research and corresponding analytical tools allow to test for how social relationships co-evolve as a result of actors changing their behavior, beliefs, or personal circumstances (e.g., Ebbers & Wijnberg, 2019; Kalish, 2020). Drawing on longitudinal network data, these so-called stochastic actor-oriented models (SOAM) simultaneously account for the effects of network structure and individual actor characteristics on tie formation, as well as how these subsequently affect the characteristics of these actors (Snijders, 2001; Steglich et al., 2006). For example, researchers used SOAMs to investigate whether similarity in smoking behavior between friends is due to selection effects (i.e., smokers befriend smokers) or social influence effects (i.e., they become smokers because their friends are smokers). Importantly, these models are equipped to also control for other network contingencies to tie formation such as the tendency for people to be friends with their friends' friends (i.e., transitivity) or the higher likelihood of friendships forming between individuals of the same sex (McPherson et al., 2001).

To illustrate (and quantify) how social connections between founders in an accelerator network can assert influence (Coleman, 1988; Granovetter, 1973; Roche et al., 2022), I employ

such a SOAM called Simulation Investigation for Empirical Network Analysis (SIENA) in Chapter 5. Given the importance of entrepreneurial emotions and feelings in starting a new venture and its success (e.g., Baron, 2008; Cardon et al., 2012), understanding the impact of networks on these factors is crucial. In particular, entrepreneurial passion – defined as intense positive emotions related to activities that are important to an entrepreneur's self-identity (Cardon et al., 2009) – is considered important in the context of starting a new venture due to the challenges and effort required of entrepreneurs (Gielnik et al., 2015). Empirical evidence supports the significance of entrepreneurial passion as a key driver of new venture success and a fundamental aspect of entrepreneurial endeavors, influencing behavior and outcomes for entrepreneurs (e.g., Murnieks et al., 2014), employees (e.g., Breugst et al., 2012), and startups (e.g., Drnovsek et al, 2016).

Previous studies also underscore that entrepreneurial passion is an important interindividual emotion affecting others in social contact with focal founders (Murnieks et al., 2020). For example, Davis et al. (2017) find that investors' perception of founder passion increases positive affect and the likelihood that they will invest. Similarly, Uy et al. (2021) show that working closely with other entrepreneurs on the same startup team makes individuals converge in their affective experience of passion for founding over time. However, because networks are already formed in these studies (Greve & Salaff, 2003), we do not yet know to what extent passion facilitated social contact to founders in the first place. For example, similarity in passion might have predisposed founders to select into the same environment and form network ties (e.g., Lawrence & Shah, 2020; McPherson et al., 2001). Therefore, I employ SIENA to provide a more complete understanding of the underlying causalities and disentangle homophily

selection from social contagion effects of passion among peers embedded in a startup accelerator. Specifically, I ask:

> *To what extent does similarity in entrepreneurial passion facilitate tie formation among peers in a startup accelerator, and to what extent is such passion socially contagious?*

Summary of Papers

This thesis presents four chapters that examine the role of social connections between mentors, peers, and founders. Conducted in collaboration with my supervisors and co-authors Joris Ebbers and Yuval Engel[3], the research herein employs a hybrid design that includes multiple methods and diverse samples to address specific research questions derived from the overarching research problem (Scandura & Williams, 2000).

As a starting point, *Chapter 2* establishes that mentoring is a prevalent practice in startup ecosystems and while research recognizes its value, it has largely focused on its outcomes and failed to differentiate it adequately from other developmental relationships such as corporate mentoring or coaching. In this conceptual chapter, we critically review the nascent startup mentoring literature, differentiate startup mentoring from other developmental relationships, and consider the implications of incorporating these differences into investigations of startup mentoring. To conceptualize startup mentoring, we adopt a social exchange lens (e.g., Cropanzano & Mitchell, 2005) and theorize the process by which startup mentors and mentees form and develop mentoring relationships. This chapter contributes to a better understanding of the match between diverse types of startup mentors and mentees, the motivations of mentoring

[3] Throughout Chapters 2–5, I will use "we", as all studies were co-authored by my supervisors.

partners, and the potential impact of startup mentoring on the mentee's and the startup's development.

In *Chapter 3*, we build on the conceptual framework outlined in *Chapter 2* to gain a deeper understanding of the factors that influence mentors' decisions to support mentees. In particular, we examine the willingness of startup mentors to mentor founders (mentees) based on competence and relationship quality indicators, while taking into account the mentors' intrinsic, prosocial, and extrinsic motives to mentor. Specifically, we conduct a metric conjoint experiment (e.g., Priem & Harrison, 1994) with a sample of 102 startup mentors who rated 16 founder profiles (n = 1,632). The results show that founder's competence and relationship quality indicators impact mentors' assessment of potential mentees, with coachability being the most important attribute. Additionally, we find that prosocial motivation in mentors can compensate for lower competence in mentees, while intrinsic motivation in mentors can compensate for indicators of lower relationship quality with mentees. The study presented in Chapter 3 is important because willingness to mentor is a precursor to initial tie formation and safeguarding mentors' choices is associated with more effective relationships (Sanchez-Burks et al., 2017).

In *Chapter 4*, drawing from theories about physical or geographic proximity and interaction rituals on the development of social networks, we explore the effects of an absence of physical proximity and offline interactions (due to the COVID-19 pandemic) on the evolution of founders' peer networks in an accelerator. Specifically, we compare longitudinal network data of two consecutive cohorts of the same accelerator – one cohort that completed the program offline before the pandemic and one that completed it online during the pandemic – using structural social network analysis. Our data show that online networks were less dense, entrepreneurs had fewer indirect connections and there was an increase in clustering, when compared to the offline

cohort. Together, these findings provide new insights into the impact of physical distancing on entrepreneurship and contributes to our understanding of peer networks and startup acceleration.

Chapter 5 aims to understand the co-evolution of social peer networks and entrepreneurial passion. Although previous studies have shown that entrepreneurial passion is contagious in that it can transfer from one person to another (making these connected individuals more similar in their passion), these studies do not account for selection mechanisms. In other words, passionate individuals could have also attracted and selected others who already had similar levels of passion prior to tie formation (for an exception: Hubner et al., 2020). Using SIENA and four waves of panel data from 89 founders ($n = 7{,}832 \times t = 4$ waves) embedded in a 5-month startup accelerator program, we disentangle the complex interplay between social networks and entrepreneurial passion. We find that (1) peer entrepreneurs establish social ties based on a shared passion for founding; (2) passion for founding is socially contagious; and (3) passion for founding is more contagious among members of startup teams than across other peer ties. Overall, we add important insights to the passion and entrepreneurial team literature as we position entrepreneurial passion as interindividual emotion that founders also select upon.

The final chapter – *Chapter 6* – provides a comprehensive summary of the main findings from all studies, examines their theoretical and practical significance, and identifies opportunities for future research.

— CHAPTER 2 —

Startup Mentoring in Accelerators and Beyond: A Conceptualization and Future Research Agenda[4]

[4] This chapter is based on a paper that has been presented at (1) the Research Group for Collaborative Spaces Symposium (RGCS), 2018 (London, UK); (2) the 34th European Group for Organization Studies Colloquium (EGOS), 2018 (Tallinn, Estonia); (3) the Academy of Management Specialized Conference (Tel Aviv, Israel); and (4) the 79th Annual Meeting of the Academy of Management (Boston, US).

Chapter 2

Abstract

Mentoring is a crucial element of startup support programs such as accelerators and incubators. While entrepreneurship scholars agree that startup mentoring is important, there is little clarity about the process by which mentoring adds value to startups and their founders. Bringing together fragmented prior work on the topic and drawing from social exchange theory as well as organizational life cycle theory, we conceptualize startup mentoring as a novel form of mentoring, distinct from mentoring and coaching in established organizations. We then propose a process model depicting the development of startup mentoring relationships. This model and the propositions it features inform a broad range of theoretical and practical issues, including the match between mentors and mentees, motivational underpinnings of mentoring partners, and the potential impact of startup mentorship on mentee as well as the startup development and outcomes.

Keywords: mentoring, accelerators, social exchange theory, life cycle stage, startups

Introduction

Launching a startup is a difficult, risky, and challenging process. To avoid common pitfalls and overcome comparative resource deficiencies associated with the liabilities of newness (Minniti & Bygrave, 2001; Stinchcombe, 1965), founders depend upon assistance from outsiders. Attempts to support founders are both ubiquitous and diverse. Assistance from advisors, such as consultants, accountants, lawyers, early grant suppliers, and even existing connections including friends and family members can facilitate the development of knowledge and foster the motivation necessary to start up (e.g., Bosma et al., 2012; Chrisman & McMullan, 2000; Dahlander & McFarland, 2013). At later growth stages, investors such as business angels and venture capitalists can mitigate key challenges through developmental coaching, strategic advice, or access to social capital (e.g., Baum & Silverman, 2004; Bernstein et al., 2022; Mitteness et al., 2012).

More recently, assistance to founders has been expanded to include accelerators which are short-term entrepreneurship programs that provide cohorts of participating founders with intensive education and access to capital (e.g., Cohen, Bingham, et al., 2019; Hallen et al., 2020). In fact, startup mentoring is considered a core service in accelerators and a main attractor to founders interested in participation (Bliemel et al., 2021; Cohen & Hochberg, 2014). The proliferation of these entrepreneurship programs means that thousands of new mentoring relationships are created every year (Cohen, Fehder, et al., 2019). Although startup mentoring is increasingly becoming acknowledged as impactful to the personal and professional development of a startup founder and her business (e.g., Assenova, 2020; Cohen, Bingham, et al., 2019; Hallen et al., 2020)., questions sourrunding the “how” such value is deliverd has been less explored.

Mentoring, by its definition stemming from corporate settings, is an interpersonal relationship that uses non-supervisory guidance and advice provided by a more senior mentor

geared towards the personal and professional development of a more junior mentee in the same organization (Haggard et al., 2011; Kram, 1985). Scholarly work within entrepreneurship has shown that access to mentors is an integral step towards entrepreneurial learning (St-Jean & Audet, 2012) and ultimately startup performance (e.g., Assenova, 2020). Essentially, mentors' knowledge supports startups in identifying the most appropriate business model and strategy while saving them the need to undertake a trial-and-error learning path (e.g., Agrawal et al., 2021; Cohen, Bingham, et al., 2019; Hallen et al., 2020). For example, Assenova (2020) shows that startups of founders paired with individuals that have a proven track record as mentors showcase higher revenue and profit growth – especially when entrepreneurs entered this relationship with little prior knowledge or experience. Per its definition and in light of its demonstrated effectiveness, startup mentoring appears to be a particularly promising way of assisting startup founders.

Despite the pervasiveness and significance of this emerging phenomena , our understanding of startup mentoring remains limited for several reasons. First, the terms mentoring, coaching, and consulting used interchangeably in the literature (Bisk, 2002; Kotte et al., 2021), which makes it difficult to compare and synthesise prior research on the topic of startup mentoring. Second, and related, although some scholars contend that mentoring founders follows the same set of functions as mentoring employees within established organizations (St-Jean, 2011), insights from traditional, corporate mentoring contexts require translation and adaptation before applying them in startup settings. For example, in startup mentoring, the mentor-mentee relationship is unique as the mentee is not a junior employee within the mentor's organization, but rather a co-owner at the top of the organizational hierarchy. Moreover, mentors in this setting are external to the mentee's startup, which means they do not benefit from their advanced organizational position or gain intra-organizational reputational benefits from successful mentees, providing a different set of resources and

incentives for mentors (Sanchez-Burks et al., 2017; Waters et al., 2002). Third, prior research focused on the outcomes for the mentored founder (e.g., Assenova, 2020; Ozgen & Baron, 2007), leaving outcomes for mentors (e.g., benefits associated with supporting startup founders) but also antecedents of mentoring (e.g., motivaions of mentors to support startup founders) underexplored.

To translate research from corporate mentoring to mentoring within entrepreneurship, particularly within accelerators (Cohen, Bingham, et al., 2019; Cohen, Fehder, et al., 2019), we build on these basic differences as our starting point to theorize about how startup mentoring unfolds. We propose a process model based on social exchange theory (e.g., Blau, 1964; Homans, 1958) in combination with the life cycle theory of nascent ventures (e.g., Fisher et al., 2016; Kazanjian, 1988) to capture the mechanisms that coordinate the evolution of the mentoring relationship and ultimately influence mentors, mentees, and their startups. We assert that the proposed model can help explain previously unanswered questions in the literature. For example, how formally facilitated and temporally restricted startup mentorships offer similar development resources and benefits given the sizable stakes (e.g., survival of the startup business), mentor's startup externality, and the formal (i.e., third-party facilitated) nature of the relationship (e.g., Allen et al., 2006a, 2006b). In doing so, we respond to long standing calls to better integrate mentoring into the contextual settings under which it occurs (e.g., Crisp & Cruz, 2009; Haggard et al., 2011; Ragins & Kram, 2008). With a growing interest in accelerator programs as hosts to startup mentoring relationships (Cohen, Bingham, et al., 2019; Hallen et al., 2020), our aim is to enrich the literature and position our model as the cornerstone for future studies about startup mentoring.

Chapter 2

Conceptualizing Startup Mentoring

Corporate Mentoring

When conceptualizing mentoring in startups, we find it useful to begin with Kram's (1985) classic work on relationships between junior and senior employees in corporate settings as it provides valuable insight into the conditions under which the process of mentoring affects the quality of the relationship and associated developmental outcomes for mentors and mentees alike. Our reading of Kram's (1985) work leads us to highlight three aspects that we see particularly noteworthy and that we suggest can serve as a conceptual yardstick when exploring definitions of mentoring in entrepreneurial contexts: *Mentor and mentee characteristics; mentor and mentee activities; mentoring relationship dynamics*.

First, Kram's (1985) analysis defines mentees as junior- and mentors as senior employees that are higher up in the hierarchy of the same organization. Because mentees are typically at an information and/or skill disadvantage, the important aspect of the mentor-mentee relationship is the sharing of knowledge and experience such that mentors primarily supplement gaps in human capital of their mentees (e.g., Ragins & Kram, 2008).

Second, Kram's (1985) definition of mentoring is based on her analysis of functions that are provided by the mentor to the mentee and include the domains of *career development* (i.e., visibility, protection, challenging assignments) and *psychosocial support* (i.e., friendship, acceptance, role model). Whereas career development functions are geared towards evolving the mentee professionally to "learn the organizational ropes", psychosocial support is aimed at mentees' personal growth, including identity and self-efficacy, and predicates on trust and interpersonal connection. In exchange, mentors gain insights in the latest technological developments, reverse learn, gain reputational benefits, may groom successors, and ultimately enjoy increased rates of performance (for an overview: Allen et al., 2004; Ghosh & Reio, 2013).

Finally, the extent to which these support resources are provided varies depending on how evolved the relationship has become (e.g., Kram, 1983). In general, mentoring is an interpersonal process that evolves over the course of several years (Kram, 1983). After mentors and mentees have become acquainted in the *initiation* stage, the majority of mentor support occurs during the second *cultivation* stage. Importantly, unlike career development that is accessible to mentees at any stage of the relationships, psychosocial support hinges on trust and mutual identifcation and therefore a more evolved relationship (Humberd & Rouse, 2016; Kram, 1985). In the final stage, the mentee becomes more self-sufficient and requires less guidance, leading to the *separation* of the mentee from her mentor. Some relationships continue beyond the mentorship and evolve into a peer or friendship dynamic (Kram, 1983).

Startup Mentoring

There are, however, important differences to be considered when mentees are startup founders as opposed to employees. First, because mentees are (co-) owners at the top of their own organization (i.e., the startup), mentees are not "junior" to the menter within the boundaries of the same organization. Although some (few) scholars propose the mentor may or may not be employed in the same organization as the mentee (e.g., Higgins & Thomas, 2001) and some mentorships can develop beyond organizational boundaries (e.g., when a mentor takes on a new job), most specify that traditional mentoring relationships unfold within the same organization (e.g., Chao et al., 1992; Kram, 1985; Ragins & McFarlin, 1990). Consequently, as startup mentor and mentee are not in a chain of command, the mentee does not feel pressured by the organization to take the mentor's guidance and feedback into consideration (Ciuchta et al., 2018; Kuratko et al., 2021). In addition, although startup mentors are more experienced individuals akin to mentors in organizations in the broader sense (Baron, 2007), they do not follow the same career trajectory per se (e.g., a senior manager mentoring an aspiring junior manager). For example, accelerators – that have

mentoring at the heart of their value proposition (Bliemel et al., 2019; Cohen & Hochberg, 2014) – employ the help of a diverse set of individuals including successful entrepreneurs, program alumni, investors, and professional experts (e.g., lawyers, accountants, marketers) to support participating founders as mentors (Cohen, Bingham, et al., 2019; Cohen, Fehder, et al., 2019).

Second, startup mentors provide comparable support across the career development domain – that we call "development support" as startup founders do not follow a typical career – and the psychosocial dimensions (e.g., Kram, 1985; Scandura, 1992). However, these need to be adapted to the new entrepreneurial context (St-Jean, 2011). With regards to *development support,* startup mentors are barred from providing "protection" (i.e., career development support) because they are external to the organization (Waters et al., 2002). Instead, mentors are particularly valuable because they can provide useful information about the industry, laws, and regulations to be aware of (e.g., Bliemel et al., 2019), and knowledge around key activities such as which markets to select, how to prepare a pitch, or hire an employee (e.g., Hallen et al., 2020; Radu Lefebvre & Redien-Collot, 2013). In addition, mentors bolster the social capital of their mentees by making introductions and sharing their social and professional networks (e.g., Bliemel et al., 2021; Hallen et al., 2020; Krishnan et al., 2020). Moreover, mentors can assist in entrepreneurial experimentation allowing mentees to "construct more informative experiments and (...) discern more precisely learning from any given experiment (Agrawal et al., 2021: 5512)."

With regards to the *psychosocial support* domain, startup mentors offer advice and emotional support through reassurance and being a confidant, identify personal strengths and weaknesses, act as a pressure relief for mentees to offload stress, and boost mentees' self-confidence and motivation to persevere (Deakins & Freel, 1998; St-Jean & Audet, 2013; Sullivan, 2000). In contrast to corporate mentors, startup mentors may need to offer more

"counseling" (i.e., psychosocial support) to build the resilience necessary to persist in rapidly changing startup environments where founders as mentees are deeply invested in their startup, not only financially as owners but also emotionally as creators of their business idea (Baron, 2008; McMullen & Shepherd, 2006). In addition, startup mentors act as role models that instigate a sense of entrepreneurial identity in acting as role models (e.g., Bosma et al., 2012), boost founders' self-efficacy (e.g., St-Jean et al., 2017), and help novel founders to develop the mindset needed to master crises, changes, and uncertainty which are typically associated with building a new company (Eesley & Wang, 2017).

Besides the benefits of the mentoring relationship for the mentee, as well as the startup as a whole, some prior studies also emphasize the benefits that accrue to the mentor. Although research on benefits for mentors generally emphasizes mentoring as voluntary activity (Bliemel et al., 2021) and means to satisfy mentors' innate desire to give back, obtain recognition, or stay in touch with the field (Sanchez-Burks et al., 2017), there is scattered evidence of more tangible mentoring outcomes including financial compensation (Sanchez-Burks et al., 2017), due diligence for potential investments (Bliemel et al., 2021; Kuratko et al., 2021), and even employment in management and board capacity (Bliemel et al., 2021; Yusubova et al., 2020). For example, in a study on evolution of startup teams, Yusubova et al. (2020) show prior mentoring activity can position mentors as ideal candidates to join mentored founders' startups as managers in the future. Finally, even though the interests of the mentee and mentor are often aligned, or at least not conflicting, there is a small risk of mentors acting against the interest of the mentee by stealing the startup idea or poaching founders which could break up the startup team (cf., McAdam & Marlow, 2007; Scandura, 1998).

Third, while most corporate mentorships occur "spontaneously based on mutual attraction, liking, and perceived interpersonal comfort" (Eby et al., 2013: 450), most startup

mentorships are formalized relationships (Ragins & Cotton, 1999), implemented to lower the failure rates, and accelerate the growth, of participating founders and their startups (Cohen, Bingham, et al., 2019). Consequently, startup mentors and mentees are either matched directly (based on the individual requirements of startups and corresponding mentor skill sets, startup sector and mentor's industry background, and availability considerations) or a match is facilitated (e.g., consulting mentor and/or mentee preferences) (Assenova, 2020; Sanchez-Burks et al., 2017).[5] Moreover, the relationship is typically limited to the formal duration of the accelerator program (Assenova, 2020; Bisk, 2002). This has important implications for the development of the relationship (Bliemel et al., 2021). Research from corporate settings consistently suggests that arranged, formal relationships may result in fewer career development and psychosocial benefits, as they carry a higher risk of personality mismatches and lack of commitment (e.g., Allen & Eby, 2003; Ghosh, 2014; Ragins & Cotton, 1999).

Table 1 presents startup mentoring definitions, highlights what startup mentors do, and how startup mentoring is organized based on prior research.

[5] Cohen, Fehder et al. (2019) draw on the example of Techstars that connects entrepreneurs to 75-100 external mentors including program alumni, investors, lawyers, and other experts from which a handful will be selected to form ongoing relationships with. To illustrate many of these mentors have profiles on Techstars' website (www.techstars.com/mentors).

Table 1: Startup mentoring in previous research

Key Element	Illustrating Quotation	Sources
What is startup mentoring and who are mentors?	Mentorship is a key component of many accelerator programs. In this context, mentorship is defined as the provision of technical and business feedback, advice and social support.	Cohen, Fehder et al., 2019: 1791
	{S}upport relationship between a novice entrepreneur (the mentee) and an experienced entrepreneur or manager (the mentor). Through the relationship, the mentee is able to develop as both an entrepreneur and a person.	St-Jean & Audet, 2009: 149
	{E}xperienced individuals who share their knowledge and wisdom.	Baron, 2007: 173
	{E}xperts with substantial experience in accelerating start-ups.	Krishnan et al., 2021: 665
What do mentors do?	{P}rovide guidance about how to construct more informative experiments and (…) discern more precisely learning from any given experiment.	Agarwal et al., 2021: 5512
	{P}rovision of expert help and assistance in overcoming problems (…) enables the entrepreneur to dissect, reflect and learn from what could be termed 'critical incidents'.	Sullivan, 2000: 163
	Mentors show entrepreneurs how to reflect from experience and to absorb the knowledge from learning events.	Deakins & Freel, 1998: 153
	{M}entors provided introductions to potential customers in various industry verticals, which allowed the venture to go through an iterative process of eliminating and prioritizing potential markets until they eventually identified the most promising ones.	Hallen et al., 2020: 397
How is startup mentoring organized?	The incubator's staff pair each entrepreneur with a mentor. These pairings last for the duration of the incubation program. During this time, mentors work individually with each entrepreneur to provide close guidance.	Assenova, 2020: 1565
	{A}ccelerators encouraged ventures to consult with customers and mentors about their products and businesses, and all had similar types of mentors—including current and former entrepreneurs, corporate executives, potential suppliers, lawyers, accountants, and investors.	Cohen, Bingham et al., 2019: 823
	{D}irectors also introduce each startup to as many as 75–100 additional mentors in a required, systematic schedule during the first month of the program and match each startup to a lead mentor who meets with the startup regularly throughout the program. Startups select a handful of mentors from this group with whom to build ongoing relationships.	Cohen, Fehder et al., 2019: 1791
	Every weekly meeting began with entrepreneurs reporting on the past week's progress and spelling out their goals for the subsequent week, followed by feedback from the mentor and the other start-ups.	Krishnan et al., 2021: 677

Startup Mentoring in Distinction to other Developmental Relationships

Despite these advances, however, extant conceptualizations of startup mentoring are less clear about the nature of the mentor-mentee interaction and how the relationship develops as a function thereof (Haggard et al., 2011). This means that current conceptualizations are, on the one hand, likely over inclusive to include mere advice relationships from relevant experts without frequent social contact (Bliemel et al., 2021). On the other hand, current conceptualizations are likely to be over exclusive by overlooking relationships that could also qualify as mentorships such as relations with accelerator staff (Cohen, Fehder, et al., 2019) or certain peers in accelerators (Mansoori et al., 2019). For example, Cohen, Fehder et al. (2019) explain that some accelerators draw a small team of internal staff instead of exposing founders to hundreds of external mentors. Therefore, a clear understanding of the role of startup mentors and the distinction from other constructs is essential for practitioners and academics alike to avoid confusion with other related development constructs. Table 2 distinguishes startup mentoring from related support relationships including corporate mentoring, peer mentoring, and executive coaching along key dimensions that are often cited as crucial elements of the mentoring process (D'Abate et al., 2003; Haggard et al., 2011; Kotte et al., 2021).

Table 2: Startup mentoring and other distinct support relationships

	Startup Mentoring	Corporate Mentoring	Peer Mentoring	Executive Coaching
Actors				
Support giver and receiver	Mentors are experienced founders or experts with relevant knowledge. Mentees are less experienced founders.	Mentors and mentees are senior and junior members of the same organization.	Mentors and mentees are employees at same organizational position.	Coachées are executives and high-potential employees. Coaches are retired executives, consultants, psychologists.
Experience Background	Founding experience or related knowledge (e.g., industry, functional, domain experience). Similar or related industries.	Organizational internal experience and knowledge. Mentor higher position at same organization.	Similar experience. Same position at same organization.	Certified coaching professional. Coaches experienced in respective development issue (e.g., leadership)
Relationship	Egalitarian	Hierarchical	Egalitarian	Directive
Purpose and Motivation	Founder mentee development (i.e., mentor as motivator, reflector, re-assurer, confidant) and startup development (i.e., mentor as information support, guide, integrator, confronter) Mentor development is complementary (give back, gain technical insights, influence, and scout investment opportunities).	Employee mentee-directed personal (i.e., mentor as source of confirmation, counseling, role modeling, friendship) and professional development (i.e., mentor as source of sponsorship, coaching, exposure, protection). Mentor development secondary (groom successor, give back, insights).	Mutual personal (i.e., mutual emotional support, confirmation, friendship, feedback) and professional development (i.e., mutual information sharing, job-related feedback, career strategizing).	Professional development of coachée through action-oriented learning (e.g., leadership, management skills, correction of behavioral issues). No complementarity. Coaches are paid.
Organization				
Matching	Third-party initiated. Formal, part of accelerator program.	Self-selected. Informal and voluntary.	Self-selected from peer group. Informal and voluntary.	Recommended by HR
Duration	Accelerator ~ 3–6 months	Several years (up to 8 years)	Enduring (up to 30 years)	Short (up to 12 months)
Frequency	High intensity consultation (e.g., daily-weekly in accelerators)	Periodic intermittent monthly meetings	Ad-hoc meetings	Periodic weekly sessions
Hierarchy	No hierarchical relationship. Mentors may be peers (e.g., experienced entrepreneurs)	Mentors typically in higher, non-supervisory, organizational position.	Peers of equal status across similar organizational levels	External coaches, seldom directive relationship

As Table 2 illustrates, startup mentoring also shares several elements with other support relationships besides corporate mentoring such as peer mentoring and executive coaching. First, peer mentoring and startup mentoring are similar in that they are egalitarian, non-directive relationships that are geared towards the development of the mentee, while at the same time also benefitting the mentor. For example, startup mentors can gain tangible benefits such as latest technological insights (e.g., Sanchez-Burks et al., 2017), which is also a hallmark of peer mentoring relations (Higgins & Kram, 2001; Kram & Isabella, 1985). In addition, in both peer and startup mentoring, the mentor and mentee hold a similar position within their respective organization's hierarchy. Besides these similarities, however, startup mentors, unlike peer mentors, tend to have more (entrepreneurial or professional) experience (Baron, 2007) and are not members of the same organization as the mentee (Waters et al., 2002). Finally, while in peer mentoring, the selection and matching is often an informal process without the involvement of the organization, in startup mentoring this tends to be a formalized process with the active involvement of the accelerator management.

Second, startup mentoring also shares elements of executive coaching. For example, executive coaches resemble startup mentors in that they are external to their mentees' organizations and typically have shorter-term relationships. In addition, executive coaches may deliver mentoring functions by taking on action-oriented developmental issues with the goal of growing and developing specific competencies (Kotte et al., 2021). In fact, St-Jean (2011) specifies "coaching" as a sub-function of startup mentoring support, which startup mentors enact when guiding founders in the implementation of their business plans. However, unlike startup mentoring relationships, executive coaching relationships are not reciprocal and involve no mutuality of social exchange (Haggard et al., 2011; Kotte et al., 2021). Instead, executive coaches are certified professionals such as trained psychologists or former executives that receive financial compensation for their services (e.g., D'Abate et al.,

2003; Parker et al., 2013). Because of this transactional nature of executive coaching as a paid service, the relationship between the executive coach and coachee is predominantly instrumental and unlikely to be, or develop into, an affective relationship.

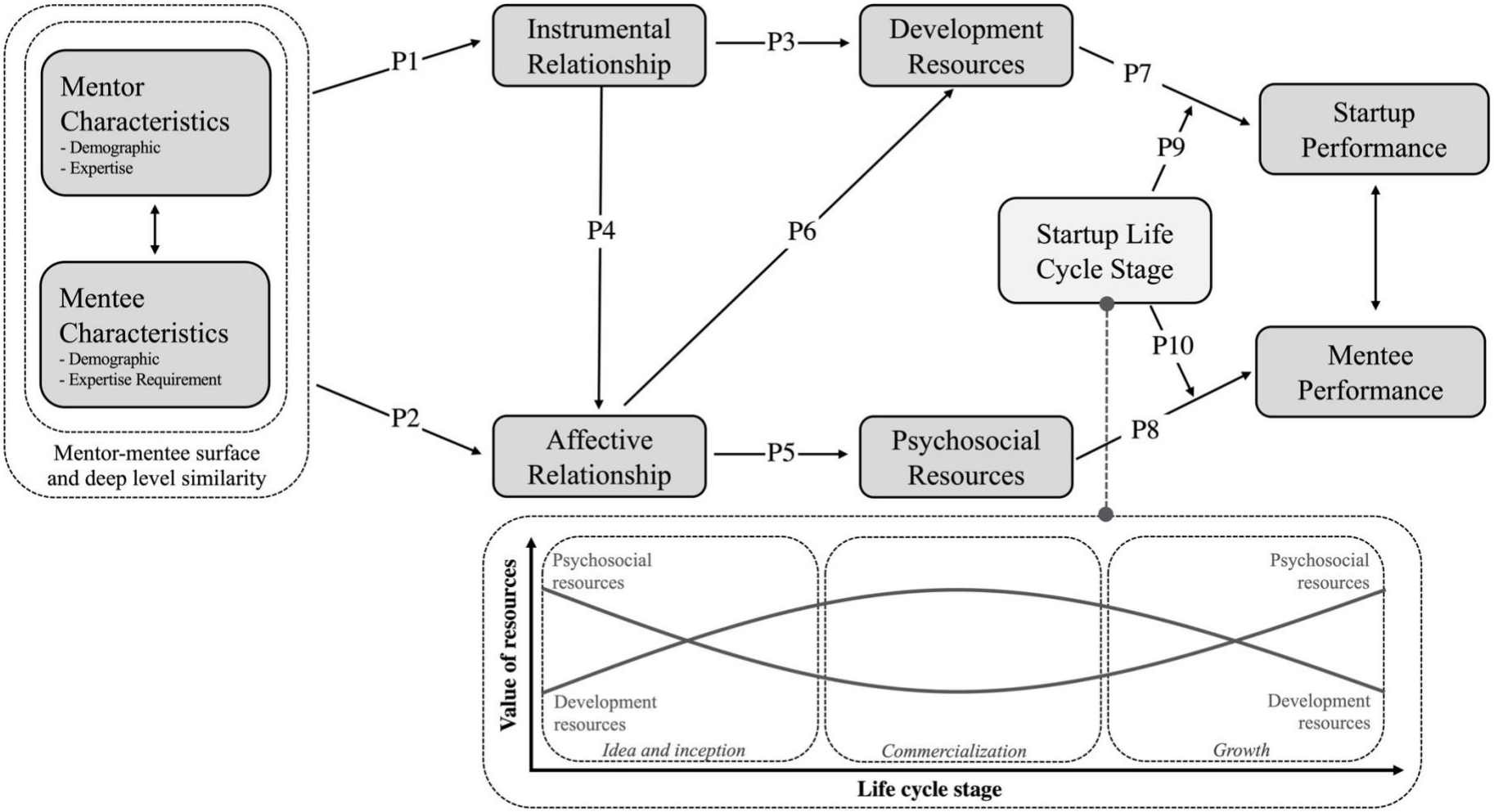
The overlap with other distinct development constructs particularly underscores the importance of a clear-cut conceptualization of startup mentoring as a basis for future research (Chao, 1998; Kotte et al., 2021). To illustrate this point, peer mentoring (Kram & Isabella, 1985) can serve as an example. In a study about sources of learning for small and medium sized companies, 43% of the founders in the sample mention mentors as being an important source of learning. However, 61% of the founders in the same study mention colleagues as a source of learning (Choueke & Armstrong, 1998). Since the respondents in this study might also interpret fellow founders as being colleagues instead of mentors, the effect of mentoring as a source of learning might actually be stronger than suggested.

An Organizing Framework for Startup Mentoring

To facilitate a better understanding of startup mentoring and illuminate the process through which relationships between founders and mentors develop and, in turn, influence the development of the former including his/her business, we draw on social exchange theory (SET) (For a review: Cropanzano et al., 2017). According to SET, social relations involve a series of sequential resource transactions between relationship partners (Mitchell et al., 2012) that include tangible and intangible resources such as money, information, services, status, and emotional support (Foa & Foa, 1980). This resource exchange is reciprocal in that resources are typically repaid in kind (Gouldner, 1960). Resource exchanges are influenced by the extent to which individuals identify the relationship as more economic and instrumental (i.e., a means to an end) or more social and affective (i.e., mutual positive affect and commitment that may be intrinsically rewarding) (Blau, 1964; Sahlins, 1965). “Economic

exchanges tend to be *quid pro quo* and involve less trust and more active monitoring, whereas social exchanges tend to be open ended and involve greater trust and flexibility" (Cropanzano et al., 2017: 480). The exchange process begins when an individual treats the exchange partner in a positive (or negative) fashion. In turn, the partner may then choose to reciprocate this treatment with good or bad behavior of her own. In other words, more positive initiating actions evoke more positive reciprocating responses and fewer negative reciprocating responses (e.g., Eisenberger et al., 1987; Gouldner, 1960). Finally, a series of successful reciprocal exchanges may transform an economic exchange relationship into a high-quality social exchange relationship. In this way, individuals may become affectively committed and more trusting to their exchange partners (Cropanzano et al., 2017). Figure 1 depicts our exchange-based model of startup mentoring in more detail.

Figure 1: An exchange-based model of startup mentoring



Making the Match

Mentoring is a standard service in entrepreneurship programs, such as accelerators, that invest significant resources in building and maintaining their mentor networks (e.g., Cohen, Fehder, et al., 2019). For example, Cohen, Fehder et al. (2019) illustrate how the prestigious *Techstars* accelerator exposes founders to hundreds of mentors early on in the program to select a handful with whom to build closer relationships. That different founders require mentors with different expertise backgrounds and skill sets is intuitively obvious. More puzzling is which mentor can best serve which founder. Although practices vary across programs, accelerators evaluate a "right" fit based on characteristics and requirements of the startup and skills and experience of the mentor. In addition, fit can be based on the interpersonal compatibility between the mentor and mentee, including demographics (Sanchez-Burks et al., 2017). Finally, mentors and mentees are either directly assigned by the accelerator or express their respective preference based on a curated list of candidates by the program management (e.g., Hallen et al., 2020).

First, corporate mentoring and entrepreneurship scholars agree that mentors typically have an experience advantage giving them the human and social capital necessary to assist startup founders (e.g., Baron, 2007; Kram, 1985) and achieve mentees' entrepreneurial learning (Mount et al., 2021). To ensure that mentors possess the relevant skills and experience to support the respective challenges of participating founders and their startups, mentors are typically vetted and recruited from different backgrounds including experienced entrepreneurs, investors, and experts with otherwise relevant experiences (Bliemel et al., 2021; Cohen, Bingham, et al., 2019; Sanchez-Burks et al., 2017). Experienced entrepreneurs, such as accelerator program alumni, can serve as valuable reference cases for currently participating founders, while investor mentors can enhance the likelihood of attracting investment by assisting with the refinement of key elements,

including financial projections, team leadership, and market analysis, which are important to potential investors (Bliemel et al., 2021; Osnabrugge & Robinson, 2000; Pauwels et al., 2016). Finally, expert mentors, such as lawyers, accountants, and marketers, utilize their domain-specific knowledge, functional expertise, and industry experience to assist startups in overcoming specific, well-defined challenges (Cohen, Bingham, et al., 2019; Cohen, Fehder, et al., 2019).

If mentors have specific expertise (e.g., same industry or functional background) directly related to the challenges of the mentored founder and his or her business, the dyad is more likely to share mental models (Hill & Levenhagen, 1995; Mount et al., 2021). These similar knowledge structures allow mentors and mentees to "speak the same language," align their task expectations, and coordinate their actions. Due to this mutual understanding, mentor and mentee face fewer difficulties collaborating (Beal et al., 2003; DeChurch & Mesmer-Magnus, 2010). By contrast, if mentors expertise is too distant, mentees reject their feedback because they perceive it as being too abstract, too novel or not relevant (Gavetti et al., 2005; Gavetti & Levinthal, 2000). This is empirically supported by Sanchez-Burks et al. (2017) who find that founders prefer actionable and concrete over abstract feedback from their mentors, while Del Sarto et al. (2022) show that mentors increase startups' incremental performance (i.e., measured as share of sales related to products that are new to the startup but not the market) but not radical performance (i.e., sales related to a completely new product). In other words, mentors' proximate, concrete knowledge on how to successfully leverage exisiting products is more useful than distant knowledge to mentored founders.

Second, accelerators take into account interpersonal factors, including demographics when matching mentors and mentees (Sanchez-Burks et al., 2017). Research on mentoring,

consistent with SET, suggests that surface-level similarity, such gender and ethnic similarity, can increase comfort levels, minimize the potential for conflict, and thus, reduce the cost of interactions (Ragins & Verbos, 2007; Viator, 1999). As a result, similarity increase the likelihood of a successful mentoring relationship (Ensher & Murphy, 1997; Ragins, 1997a, 1997b). For example, similarity in terms for gender can help prevent potential liability due to real or perceived sexual harassment (Ensher & Murphy, 1997). The underlying mechanism is the principle of similarity attraction, which states that people are attracted to those who they perceive to be similar, leading to more positive interactions and higher levels of trust (Byrne, 1971; Ertug et al., 2022). As such, readily observable similarity can be leveraged to quickly create interpersonal attraction and facilitate identification such that mentors and mentees' selves begin to develop cognitive overlap (Humberd & Rouse, 2016). In other words, identification means that "protegée's successes and failures become the mentor's successes and failures, and vice versa" (Humberd & Rouse, 2016: 439). For example, a woman mentee may recognize herself more readily in a woman mentor and may project her understanding of what it means to be a woman in entrepreneurship (Rocha & Praag, 2020). Likewise, a common industry background or shared entrepreneurial experiences from past founding activities, for example, can be used to deduct resource needs and reduce corresponding information seeking efforts (Berger & Calabrese, 1975). We propose:

Proposition 1: Conditional upon a relationship forming, the lower the surface-level similarities between mentors and his or her mentees, the more likely an *instrumental* relationship will form.

Proposition 2: Conditional upon a relationship forming, the higher the surface-level similarities between mentors and his or her mentees, the more likely an *affective* relationship will form.

Instrumental Relationships and Development Support

According to corporate mentoring scholars, newly formed mentorships and other relationships that have not yet established a strong identification, tend to be more instrumental in nature (Kram, 1983, 1985). In instrumental relationships, mentors and mentees have clear expectations regarding the parameters of the relationship (Molm et al., 1999) and engage in resource exchange based on the costs and benefits they anticipate from each other's mutual goal advancement (Ensher et al., 2001; Young & Perrewé, 2000). While startup mentoring is generally a voluntary activity (Bliemel et al., 2021), previous research indicates that startup mentors may offer their support in exchange for financial compensation, access to the latest industry insights, or the chance to conduct due diligence and make direct investments in the startups they are helping to build (Bliemel et al., 2021; Kuratko et al., 2021; Sanchez-Burks et al., 2017). In return, mentors offer financial resources, generic business advice, feedback, or access to social networks (Kuratko et al., 2021; St-Jean, 2011). In line with SET, which posits that instrumental relationships are based on the exchange of tangible, economic resources that are not specific to any one partner and whose value is independent of the relationship itself (Blau, 1964; Cropanzano et al., 2017), we propse that generic advice or access to a mentor's industry contacts has inherent value as a developmental resource.

Proposition 3: The instrumental relationship dimension of startup mentoring entails the exchange of development resources.

SET proposes a reciprocal give-and-take between relationships and specific instances of resource exchange such that relationships shape resource exchanges and the outcomes of exchanges in turn shape relationships (Blau, 1964; Cropanzano et al., 2017). That means, while unsuccessful or no longer useful resource exchanges can lead to the deterioration of a mentoring relationship (Cropanzano & Mitchell, 2005; Hu, Baranik, et al., 2014), the fulfillment of mutual

expectations through ongoing exchanges can actually strengthen a relationship over time, creating a foundation of trust, liking, and mutual obligations between mentor and mentee (Blau, 1964; Haggard & Turban, 2012). While not all of those interactions will develop into full-fledged mentorships (Ozgen & Baron, 2007), some mentors and mentees begin to perceive greater benefits from the relationship as they become more emotionally invested in their respective partner. Finally, Hallen et al. (2020) provides anecdotal evidence when suggesting that despite interacting with hundreds of mentors in accelerators, founders usually establish enduring connections with only a few of them.

Such an evolution from instrumental to affective relationships is consistent with extant research on organizational mentoring which shows that, over time, mentors and and mentees have more opportunity to discover deeper level similarities as a basis for mutual identifcation (e.g., Ghosh, 2014). For example, Menges (2016) shows that mentees who share the traits of conscientiousness and openness to experience with their mentor, receive more mentoring support (i.e., more resource exchange) because this inhibits conflict and makes the relationship more rewarding. Consistently, Kram (1983, 1985) states that while early mentoring relationships entail mere development support, some relationships manage to evolve into providing a higher degree of psychosocial support. Humberd and Rouse (2016) explain these findings by theorizing that continued interaction enables mentors and mentees to either recognize that they share similarities, or integrate qualities of the other into the self concept (i.e., individual's perception of their own abilities, traits, and characteristics, including their thoughts, feelings, and beliefs about themselves) as basis for identification. For example, in the first case, a mentee may discover that his or her mentor shares a similar passion for tinkering with technical product solutions (i.e., identification via recognition). In the second case, mentors and mentees would actually alter their

selves to become more similar to the other (i.e., identification via integration). For example, a mentor might change to view him- or herself as a tech savvy person based on reverse learning from technological insights provided by the mentee.

Although a startup mentoring relationship is significantly shorter than mentoring in traditional contexts – as it is bound by the duration of the accelerator program it unfolds in (Assenova, 2020) – mentor and mentee interactions occur frequently, often on a daily or weekly basis (Cohen, Fehder, et al., 2019; Hallen et al., 2020). For example, Cohen, Bingham et al. (2019) explain how accelerators concentrate mentor consultations such that founders are being busy with little else but back-to-back meetings with mentors in the first weeks of the programs. Repeated interactions with some mentors across these meetings should propel identification because these interactions involve ample opportunity for discovery and disclosure of cognitive similarity including values, interests, and personality (Humberd & Rouse, 2016; Ragins, 2012). In sum, this suggests, that as mentors and mentees continue to engage in instrumental relations, more information becomes available over the respective other (e.g., values, interests, personality), and similar others are filtered out to build closer relationships with. We propose:

Proposition 4: Over the course of continued resource exchanges, mentors and mentees in instrumental relationships will develop an affective relationship.

Affective Relationships and Psychosocial Support

In affective relationships, greater trust and normative expectations of reciprocity are necessary preconditions for – and govern resource exchanges across – succesful relationships (e.g., Blau, 1964). That is because affective relationships entail the transfer of particularistic resources which may be of a different modality (Cropanzano et al., 2017). Consider, for example, the personal advice stemming from past experiences that a mentor offers in return for the good feeling of helping a struggling founder. The value of this advice is contextually defined

by this specific mentor relationship (i.e., the same advice might be harmful to another founder) and builds on established trust within the mentor relationship. On the one hand, because the mentor generally has far deeper knowledge and experience than the mentee, mentees must make decisions under asymmetric information and therefore need to trust that mentors have their best interest in mind. On the other hand, when sharing critical knowledge mentors are also vulnerable as it often relies on their past failures and sensitive information.

Consistently, corporate mentoring theory posits that mentorships which either immediately establish identification through recognition of surface-level similarities or through repeated interactions that enables partners to identify deeper-level similarities follow an affective relationship trajectory (Humberd & Rouse, 2016). For example, Bosma et al. (2012) find that existing, affective mentorships are more likely to involve experienced entrepreneurs who share similarities, including gender, nationality, and industry background and state that "{r}ole models with a mentoring function are often sourced from 'strong tie' relationships (Bosma et al., 2012: 422)." These evolved mentoring relationships are characterized by high levels of mutual trust to allow for the transfer of psychosocial support resources (Kram, 1983, 1985). Unlike development support that entails more universal resources (e.g., money, industry contacts) with value irrespective of who the exchange partner is, psychosocial support (e.g., personal advice, emotional comfort, role modeling) is idiosyncratic to the relationship of exchange partners. This is consistent with SET (Cropanzano & Mitchell, 2005), which suggests that mentors may provide different resources (such as emotional support) than mentees (such as technical insights or a future board seat). Therefore, mentoring partners must trust that the value of the resources exchanged will be reciprocated in some way in the future (Molm et al., 1999).

Proposition 5: The affective relationship dimension of startup mentoring entails the exchange of psychosocial resources.

Finally, although instrumental and affective relationships are conceptually distinct, exchanged resources can be interlaced (Huang & Knight, 2017). Specifically, affective relationships with strong interpersonal bonds that are characterized by reciprocity, mutual liking, and trust (Blau, 1964) include exchange partners that are motivated to help each other (Krackhardt, 1992). Because identification means mentors provide high amounts of both development and psychosocial support (Kram, 1985), affective relationships may also entail the exchange of development resources (Sahlins, 1965). In that context, interpersonal feelings of trust and mutual liking characterizing affective relationships can spill over to affect the degree to which mentor and mentee regard themselves as capable of contributing to more instrumental goals of their relationship (Huang & Knight, 2017). For example, research on supervisor relationships holds that affective bonds influence subsequent performance evaluations (Sparrowe & Liden, 1997) and individuals in organizations actually seek out colleagues that they like for instrumental resources (Casciaro & Lobo, 2008). Likewise, friends and family members of founders, characterized by strong affective ties, are a prominent source of instrumental development resources such as capital (Kotha & George, 2012).

Proposition 6: In addition to psychosocial resources, the affective relationship dimension of startup mentoring entails the exchange of development resources.

Startup Mentoring Outcomes

Thus far, we have suggested that startup founders and their mentors form relationships with one another to fulfill resource needs. We have also suggested that different dimensions of the mentoring relationship motivate the exchange of different kinds of resources. Whereas instrumental relationships embed more tangible development resources, affective relationships are interpersonally close and involve higher levels of trust and the exchange of more intangible

psychosocial resources. Next, we elaborate how these different relationship trajectories feed into distinct, but related, mentorship outcomes. In particular, we argue that development resources may be most beneficial to mentees' startups whereas psychosocial resources may be primarily geared towards growing the founder as entrepreneur.

First, startup mentoring provides a means for ensuring that founders are provided with actionable advice from individuals with greater resources, expertise, and social networks, ultimately increasing the likelihood of startup success and survival (Amezcua et al., 2013). According to Hallen et al. (2020), for example, mentorships in the context of accelerators are generally arranged around the specific resource needs of startups. Early on in the program, mentors support startup founders in product building; during the program, mentoring focusses on marketing and distribution strategies; and towards the end of the program, mentoring evolves around connecting to investors and preparing the "Demo Day" pitch. Similarly, Cohen, Fehder et al. (2019) propose that many accelerators bring in specific "expert mentors" on an ad hoc basis to address specific problems participating startup face while Cohen, Bingham et al. (2019) suggest that mentors increase the density of information founders have at their disposals either directly through mentors' extensive knowledge and experience or by making connections to their extended network. Finally, that mentoring is aimed at growing startups also becomes clear when looking at recent quantitative studies of Del Sarto et al. (2022) and Assenova (2020). The former study demonstrates that when founders exchange more information and experiences with mentors, their startups show greater improvement to their products and services, while in the latter study startups mentored by more capable and experienced mentors (based on track records from prior mentorships) have significantly increased revenue and profits.

Proposition 7: Development resources provided by mentors benefit mentees' startups.

Second, startup mentoring can also contribute to the personal development of the mentees as entrepreneurs (St-Jean, 2011). According to corporate mentoring theory, personal learning can be understood in terms of gaining greater clarity of one's professional identity, achieving a deeper understanding of personal values, strengths, and weaknesses, and increasing awareness of one's developmental needs, reactions, and patterns of behavior (Higgins & Kram, 2001). Such learning can be stimulated by a strong affective bond between the mentor and mentee, which can act as a source of emotional support and foster entrepreneurial learning from the mentor's personal experiences (St-Jean, 2011) and has longer-term benefits that are not bound to the founder's current startup (Sullivan, 2000).

Consistently, Eesley and Wang (2017) as well as Bosma et al. (2012) position mentors as role models – a psychosocial support resource within corporate mentoring theory (Kram, 1985) – to aspiring founders and show that mentors inspire and motivate mentees thus building the necessary confidence for successful entrepreneurship. Further, consistent with St-Jean's (2011: 69) view of mentors as "reflectors," several studies within entrepreneurship research more generally show that mentors can provide greater clarity on goals and priorities and teach mentees how to identify personal strengths and weaknesses (Deakins & Freel, 1998; St-Jean & Audet, 2012; Sullivan, 2000). Further, because founders tend to be overly optimistic; overemphasize information that is consistent with their preconceived ideas; and more readily discard information that would contradict these beliefs, Cohen, Bingham et al. (2019) specifically position mentoring as a means to overcome such bounded rationality. Finally, Ozgen and Baron (2007) show that access to mentors makes founders more alert to opportunities and increases self-efficacy. That is due to mentors providing founders with the mental framework to structure the excess of relevant information. Therefore, we prose:

PROPOSITION 8: Psychosocial resources provided by mentors benefit mentees as entrepreneurs.

Finally, we acknowledge that mentee performance and startup performance likely coevolve such that mentee performance increases startup performance, and vice versa. Thus far, we positioned psychosocial support as antecedent to mentees' ability to recognize entrepreneurial opportunity and increased self-efficacy, helping mentored founders persist and stay motivated (Ozgen & Baron, 2007; St-Jean & Audet, 2009; St-Jean & Tremblay, 2020). Ample evidence suggests that entrepreneurs higher in self-efficacy set more challenging goals, are more persistent towards the achievement of their goals, and are more likely to recover quickly from failure (Bandura, 1997) and ultimately run better performing startups (Miao et al., 2017). Having a mentor helps mentees to learn from failure (Agrawal et al., 2021; Deakins & Freel, 1998). At the same time, previous successes in starting and running businesses are often the most powerful antecedents in building self-efficacy (Bandura, 1997; Gielnik et al., 2020; Shelton, 1990). Therefore, skills developed while carrying out activities related to the current startup contribute to the success of startups in the future (Baron & Henry, 2010). For example, founders tend to identify business opportunities that are related to the knowledge and information they already possess (i.e., obtained from running their current business) (Shane, 2000). In sum, there is a strong rationale to expect that startup performance feeds back into mentee performance.

Life Cycle Stage of Mentees' Startups

In the final set of propositions, we argue that the value of development and psychosocial resources provided by mentors is not consistent across different stages of mentees' startups. Rather, the value of these resources varies depending on the particular stage of the startup. Several insightful reviews on startups life-cycle stages (e.g., Churchill & Lewis, 1983; Fisher et

al., 2016; Kazanjian, 1988; Vohora et al., 2004) have summarized that startup development, and the resources required to fuel that development, co-evolve. For example, whereas early-stage startups face core challenges around technological uncertainty in the context of developing the product or service, startups at later stages have to overcome market uncertainty by identifying the right market to address and selecting the suitable launch strategy. Overcoming such market and technology related challenges demarcates the transition to the next life cycle stage (e.g., Kazanjian, 1988). Although such life cycle stages are sometimes divided in a more fine grained fashion and given different labels across the extant literature, the stages described therein tend to be conceptually similar and include*: Idea and inception* stage, *commercialization* stage, and *growth* stage.[6]

We propose that the resources founders require from their mentors are moderated by the life cycle stage of the startup in question. Specifically, the challenges founders face at different stages of startup development, amplify the value of different mentoring resources (Hite & Hesterly, 2001). For example, a founder without training in accounting may be able to perform basic revenue projections but will find it difficult to establish a full-scale accounting system as the startup develops (Foo et al., 2005). In turn, in the early stage, mentors might be required to provide comfort and instill the belief that founders will develop the required skill in due time (i.e., psychosocial support), whereas in later stages, mentors may be required to provide the expertise and insights for mentees to actually establish such a system (i.e., development support).

[6] Kazanjian (1988) labels idea and inception as "conception and development" stage and positions "stability" (i.e., startup growth slows to a level consistent with market growth) as a fourth stage which we omitted as organizations are no longer startups but instead mature companies. Churchill and Lewis (1983) explain startup growth as transition through key crisis from (1) existence (i.e., obtain customers and deliver products and services) to (5) resource maturity (i.e., companies have established themselves on the market). Likewise, Vohora et al. (2004) position (academic) startup growth as overcoming critical junctures including (1) opportunity recognition; (2) entrepreneurial commitment; (3) threshold of credibility; and (4) threshold of sustainability. Finally, Fisher et al. (2016) conceptualize startup growth as development of organizational identities increasing legitimacy for different resource providers and propose three stages including (1) conception; (2) commercialization; and (3) growth.

Consequently, we propose that as resource requirements change, so does the type of mentoring relationship in the best position to provide them.

First, at the *idea and inception* stage, founders develop products and services in an attempt to establish technological plausability (e.g., a product is technically possible to implement) (Kazanjian, 1988). Although founders might require development support in the form of technological knowledge and advice from mentors with relevant experiences to build and refine prototypes (e.g., industry experts), entrepreneurs also face an overload of information, high uncertainty, and are under constant time pressure (Baron, 1998). Ambiguity is so great, that it may not even be clear what the product should exactly be, which markets may be viable, or what decisions are most important to make (Kazanjian & Drazin, 1990). Therefore, the personal and disclosing conversations that emerge informally and are central to affective relationships (i.e., rather than in response to specific resource requests) provide the variety of psychosocial resources founders need to reduce ambiguity and cope with anxiety at such early stages (Bosma et al., 2012; Waters et al., 2002).

Bosma et al. (2012) show that, compared to technical guidance and advice, the value of inspirational and motivational support that mentors provide is stronger at the pre-startup stage – especially when founders have no prior startup experience. Likewise, several studies suggest that strong, affective relationships are generally more important at early stages compared to calculative and economic relationships that become more important at later stages of startup development (e.g., Davidsson & Honig, 2003; Elfring & Hulsink, 2007; Hite & Hesterly, 2001). This builds on the notion that psychosocial support from affective relationships may spark the confidence and self-efficacy (St-Jean & Audet, 2012; St-Jean & Mathieu, 2015) relevant for continued experimentation early on in the entrepreneurial process (Ries, 2011). In addition,

mentors can act as role models by sharing their own experiences, helping founders to clarify their goals and values, and ultimately develop a strong sense of their own entrepreneurial identity (Hayter et al., 2022; St-Jean, 2011).

Second, once products and services are plausible, startups enter the *commercialization* stage. While technological uncertainty is reduced because founders have demonstrated technological feasibility and progress (Fisher et al., 2016), and founders have grown into their role as entrepreneurs (Chandler & Jansen, 1992), market uncertainty remains high. Startups at this stage must win customers, establish credibility, figure out business models, and begin to deliver on promised goods or service (Kazanjian, 1988). That means, although problem sets become more refined, they increase in scope as founders find out how to make money from their products, establish product-market fit, and gather relevant knowledge around legal, economic, and financial issues to reduce market uncertainty (Churchill & Lewis, 1983; Vohora et al., 2004). However, when founders are technical experts such as inventors, academics, or product engineers they may lack relevant business knowledge (Roche et al., 2020). In addition, especially novice founders typically have underdeveloped social networks to engage the challenges associated with establishing product-market fit (Harper, 2008). Hence, founders have to rely not only on external sources of information and advice (Elfring & Hulsink, 2007; Greve & Salaff, 2003) but also benefit from social connections and endorsements provided by others.

Underscoring clear development objectives of founder's startup at the commercialization stage, mentors such as experienced entrepreneurs, industry experts (e.g., financial technology), and functional experts with relevant knowledge in the respective domain (e.g., marketing), can be drawn upon to compensate for the lack of human and social capital and provide founders with a greater understanding about how to articulate a value proposition or how to engage with

customers and address customer demands (Alexy et al., 2021; Cohen, Bingham, et al., 2019). Consider a mentor with industry experience helping a founder to select a suitable market by making connections to potential customers and partners (Krishnan et al., 2020). Elaborating on the idea of such a knowledge gap, Lundqvist (2014) shows that technology startups supported by surrogate entrepreneurs (i.e., individuals who are not among the original founders, brought in to launch a startup) who supplement technical expertise of founders with relevant commercial and managerial expertise, outperform startups without such support in terms of revenue and startup growth. Similarly, founders can reach out to investors to prepare the startup for subsequent funding rounds.[7] Startup investors not only provide valuable mentorship by offering management or domain-related expertise, such as operational and strategic guidance, but they can also grant access to employees, board members, customers, and other investors (e.g., Baum & Silverman, 2004; Maxwell et al., 2011; Sapienza, 1992).

Finally, once founders have developed their technology into prototypes and released their product on the market (i.e., product-market fit), startups enter the *growth* stage. At the growth stage, core challenges evolve around scaling up the startup (Fisher et al., 2016; Kazanjian, 1988; Vohora et al., 2004) and address questions such as how to re-organize the startup by introducing more formal and hierarchical structures that support the growing number of more specialized employees (e.g., DeSantola & Gulati, 2017; Eisenhardt & Schoonhoven, 1990). In contrast to earlier stages, where the lack of specialized knowledge and skills means founders have to rely on external sources for advice and expertise (Elfring & Hulsink, 2007), by the time the startup enters the growth stage, their founders have had ample opportunities to learn or hire specialized employees (Churchill & Lewis, 1983; Singh & Agrawal, 2011). While at early stages, the

[7] We note that investors as mentors are typically not involved in investment capacity when mentoring within entrepreneurship programs (e.g., Scott et al., 2020).

founder's values and beliefs form the basis of organizational culture , employee growth tends to lead to the formation of subgroups in the organization (Desantola & Gulati, 2017). Therefore, founders must come to terms with the fact that they are no longer at the center of the organizational culture and must confront the challenge of relinquishing control (Wasserman, 2017) by tranferring responsibilities to employees with more narrow, specialized roles (DeSantola & Gulati, 2017). Affective and trusting relationships with mentors who have gone through similar experiences can help founders navigate crises of leadership by providing a safe space to share personal experiences and draw upon their mentor's insights (St-Jean, 2011). Yusubova et al. (2020), for example, find that while it is common for founders to transition into non-management, board, or even silent partner roles given their lack of specialized knowledge, ongoing mentoring relationships can sometimes even be used to fill the vacated position.

To summarize, founders and their startups encounter unique challenges at various stages of their life cycle. In the idea and inception stages, founders face significant ambiguity and anxiety as they launch their businesses and begin to identify as entrepreneurs. As startups progress to the commercialization stage, founders typically have clear expectations about the developmental issues at hand. At the growth stage, founders must learn to relinquish control and transition into managerial roles. Therefore, we propose:

PROPOSITION 9: There is a U-shaped relatonship between the value of psychosocial resources and mentee performance over the startup's life cycle.

PROPOSITION 10: There is an inverted U-shaped relatonship between the value of development resources and startup performance over the startup's life cycle.

Key Themes and Promising Paths Forward

Mentors are quality differentiators of accelerator programs (e.g., Bliemel et al., 2021; Cohen, Fehder, et al., 2019; Sanchez-Burks et al., 2017). However, not all mentorships are of the

same quality. We conceptualized startup mentoring as a distinct development construct by offering theory and propositions in which startup mentoring is regarded as a bi-directional resource exchange that develops over time. Specifically, we suggested that startup mentors form both instrumental and affective relationships with founders. Instrumental relationships provide development support, while affective relationships provide both development and psychosocial support. The trajectory of the relationship – whether it follows an instrumental or affective path – is determined by mutual identification, which in turn hinges on contingencies such as mentor-mentee similarity and continued successful resource exchanges. The process model we propose (Figure 1) offers a starting point for understanding mentorship processes and suggests a number of interesting avenues for future research.

The first contribution of our review and conceptualization is the explication of startup mentorships as relationships that entails the bi-directional transfer of resources. Currently, startup mentoring literature presently focusses mostly on the consequences that mentoring produces for mentored founders and their startups. Mentors are "often treated instrumentally, as resources/objects, as opposed to subjects with agency (Bergman & McMullen, 2021: 703)." Although we have aggregated fragmented findings including mentoring as means to give back, obtain recognition, financial compensation or influence (e.g., Bliemel et al., 2021; Sanchez-Burks et al., 2017; Yusubova et al., 2020), a more comprising view of mentor's underlying motivation – such is present within established strand of corporate mentoring research (e.g., Allen, 2003; Haggard et al., 2011; Janssen et al., 2014) – is still lacking. This corporate mentoring literature has uncovered important antecedents such as mentor's intrinsic, prosocial, and extrinsic motivations, which informs important steps in the mentoring process such as the

selection of mentees or the provision psychosocial versus (career) development support (e.g., Allen, 2003; Allen et al., 2000; Hu, Wang, et al., 2014).

Therefore, we encourage scholars to consider how distinct motivations to mentor founders inform important antecedents of mentoring such as the selection of founders as mentees. For example, recent work shows that mentors can identify "winners" based on short summaries containing information on a startup's value proposition, founding team, and achieved milestones at above chance rates (Scott et al., 2020). If mentors driven by extrinsic self-interest are more likely to select "stronger" founders (Allen, 2004), "weaker" founders (i.e., the one's that would benefit the most) are likely to be left out. This might be particularly interesting in accelerators with a social purpose, designed to support entrepreneurship among disadvantaged groups (e.g., refugees) which might require not only stronger mentors, but also mentors with a (prosocial) motivation that aligns with the purpose of the accelerator (e.g., Pandey et al., 2017). In addition, future research may explore the possibility that different mentor types (e.g., experienced entrepreneurs, investors, experts) not only support founders based on different motivations but provide different support resources or may expect different returns on their time and resource investment (Allen, 2003, 2004).

Throughout accelerator programs, founders are not only exposed to an array of support providers including experienced entrepreneurs, investors, and experts that are commonly referred to as "mentors" (e.g., Cohen, Bingham, et al., 2019) but also to staff of entrepreneurship programs, researchers, and peers (e.g., Cohen, Fehder, et al., 2019; Scott et al., 2020). It is therefore also relevant to illucidate the extent to which support providers qualify as "mentors". The question "Who is a mentor?" has received ample attention within corporate mentoring research (e.g., Haggard et al., 2011; Higgins & Kram, 2001; Thomas & Kram, 1988). Hence, we

encourage future research to assess the extent to which developmental relationships in startups ecosystems provide mentoring functions. Related research from corporate contexts has demonstrated that relationships with peers (e.g., Kram & Isabella, 1985) and even concurrent relationships including family and friends (e.g., Burke et al., 1995) can provide (career) development and psychosocial support and therefore be understood in terms of mentoring. Likewise, it is well-known that early-stage investors such as business angels and VCs can make non-financial contributions in addition to financial ones (e.g., Huang & Knight, 2017; Politis, 2008) and that contact to peers add value as source of knowledge and motivation to startup founders (e.g., Amezcua et al., 2013; Del Sarto et al., 2022). By disentangling such mentoring heterogeneity (e.g., disentangling peers that provide mentoring functions from peers that do not provide mentoring functions), future research could attribute value added of distinct development relationships more precisely.

Another implication of viewing mentoring as the provision and exchange of resources, concerns the emerging understanding that startup mentoring has important performance outcomes. Making introductions, engaging in social and emotional support behaviors, and providing advice and feedback are just some of the means through which mentors routinely influence mentees' development as entrepreneurs as well as their businesses (Sanchez-Burks et al., 2017). Although extant work grouped mentor behaviors in the two broad categories of development support and psychosocial support (Kram, 1985; St-Jean, 2011), we encourage future research to disentangle which specific kinds of mentor support behaviors relate to which performance outcome. For example, prior studies show that information, advice, and feedback mentors provide, fill founder's knowledge and experience gaps to foster revenue and profit growth (Assenova (2020) and make mentees more proficient in recognizing entrepreneurial

opportunities (Ozgen and Baron (2007). In addition, Bosma et al. (2012) link inspiration and motivational support with increases in self-efficacy in mentored founders. In similar vein, future research could explore if emotional support increases entrepreneurial motivation and persistence (e.g., Murnieks et al., 2020) or if mentor's endorsements of founders when making connections to investors increases subsequent funding likelihood (e.g., Navis & Glynn, 2011).

A second contribution of our theory is the explication of startup mentorships as relationships that evolve as a function of successful resource exchanges. Understanding how mentoring relationships evolve informs the emerging understanding that mentoring practices vary considerably within accelerators, yet also across related entrepreneurship programs. A plethora of entrepreneurship programs including pre-accelerators (Merguei, 2022; Merguei & Costa, 2022), accelerators (Hallen et al., 2020; Pauwels et al., 2016), and incubators (Aernoudt, 2004; Mian, 1997) provide mentoring as a service to resident or participating founders (Bergman & McMullen, 2021). However, the respective approach to how mentoring is organized shapes the quality of mentor-mentee interaction and therefore affords or constrains different functional forms of mentoring support and the success of mentoring (Audet & Couteret, 2012). For example, Cohen (2013) urges that assigning mentors as opposed to facilitating meetings and letting mentors and mentees self-select corresponds to less entrepreneurial learning. Nevertheless, Hallen et al. (2020) illustrate that while some accelerators arrange meetings with hundreds of mentors initially because it is "really hard to predict who is going to have chemistry with whom (Cohen, Bingham, et al., 2019: 839)", others assign mentors directly at start or have mentors select founders whom to work with. Similarly, Cohen, Bingham et al. (2019) argue that mentoring should be concentrated at the beginning of the program to leave founders ample time to evaluate and implement received feedback. Yet, research by Cohen, Fehder et al. (2019)

shows that mentoring in prestigious accelerators occurs regularly throughout the program either by in-house experts on a weekly basis (e.g., Y Combinator) or by external "lead" mentors on a frequent basis (e.g., Techstars). Finally, while some authors suggest that mentoring ends with the program (e.g., Assenova, 2020; Bisk, 2002), mentoring theory holds that relationships can be redefined characterized by a mutual respect and friendship between peers beyond the boundaries of the formal program (Chao, 1997; Kram, 1983).

Given the great variance of how mentoring is organized in practice, future research may explore the trade-offs associated with these program choices to focal mentoring outcomes. For instance, up-front concentrated mentoring consultation that allows founders to consolidate feedback and fruitfully implement development support resources may be costly in terms of developing a trusting, affective relationship characterized by higher levels of psychosocial support resources (Humberd & Rouse, 2016; Kram, 1985). Because mentoring entails regular, frequent interactions and mutual resource exchange, founders in some programs may have a mentoring episode characterized by only development support instead of being in a fully developed, affective mentoring relationship providing high levels of both development and psychosocial support (Haggard et al., 2011; Higgins & Kram, 2001). For example, it seems more likely that founders develop affective relationships with their lead mentors than with ad hoc expert mentors.

Finally, although most mentorships are developmental for mentors and mentees alike (Allen et al., 2004; Eby et al., 2006), dysfunctional mentoring outcomes, including dissatisfaction and specific negative experiences, are possible – even without malicious intent on the part of either party (Scandura, 1998). Consistent with corporate mentoring research (e.g., Eby et al., 2000), Sanchez-Burks et al. (2017) identify bad mentor-mentee fit, inappropriate mentor

behavior, and lack of engagement as the three primary reasons for negative mentoring experiences. First, mentors may be different in personality and values or lack the technical expertise to support founders. For example, although Assenova (2020) shows that mentoring founders is associated with revenue and profit growth, these benefits seem to be limited to founders supported by a subset of highly skilled mentors. Second, mentors could use mentorships to gain latest technological insights or even appropriate mentees' ideas (cf., McAdam & Marlow, 2007). Third, without sufficient time commitment, mentors (and mentees) thwart establishing a close, trusting relationship necessary to maximize the benefits of mentoring (Kram, 1985).

According to SET, individuals reciprocate with like behaviors (Eisenberger et al., 1987; Gouldner, 1960). Therefore, the perception of harmful mentor (or mentee) behavior might trigger similarly dysfunctional behavior causing a deterioration of the mentoring relationship (Haggard, 2012). Importantly, the majority of entrepreneurship programs have no clear procedures in place to terminate dysfunctional mentorships (Sanchez-Burks et al., 2017). Thus, we encourage future research to enhance our understanding of antecedents and consequences of harmful startup mentoring relationships. In addition, because positive and negative mentoring experiences can occur within the same mentorship (Eby et al., 2000), future research is required to answer questions, such as what keeps founders in harmful mentorships? How does the level of emotional connection between mentors and mentees affect the likelihood of mentorship dysfunction, and what are the consequences of dysfunctional relationships in mentorship? How many good mentoring interactions are require to offset bad ones?

Conclusion

Startup mentoring plays a pivotal role in shaping founder mentees and their startups including, self-efficacy, persistence, skill and expertise development as well as entrepreneurial entry, startup survival, revenue, and profit growth. Yet, the "why" and "how" of mentors' engagement in the support of startups and their founders has largely escaped the attention of entrepreneurship and mentoring scholars. In this paper, we drew on what we know from corporate mentoring and expanded upon what we know about the differences between corporates and startups to give a conceptualization of startup mentoring processes. This effort led us to develop an exchange framework as means to map different types of mentor relationships through which mentors and mentees fill distinct resource needs. Specifically, our theoretical propositions highlight the distinct pathways through which mentors can contribute value to mentees and their startups, offering the foundation for future empircal work on startup mentoring. Our theorizing invites scholars to more deeply consider which startp mentorships achieve that "chemistry" (Cohen, Bingham, et al., 2019) as well why and when it is necessary.

— CHAPTER 3 —

Who Gets a Mentor? The Effects of Founder Characteristics and Startup Mentor Motivations on Founder Selection[8]

[8] This chapter is based on a paper that has been accepted for presentation at the 39th European Group for Organization Studies Colloquium (EGOS), 2023 (Cagliari, Italy).

Abstract

Startup mentoring is widely recognized as a crucial service for founders in accelerators, but mentors are a scarce resource and only support a small proportion of the startups that solicit their services. In our preregistered study, we use a conjoint experiment to examine mentors' willingness to mentor as predicted by indicators of mentee competence (startup external recognition and founder entrepreneurial experience) and relationship quality (coachability and gender concordance). Based on self-determination theory, we further test hypotheses about the moderating role of mentors' motivational dispositions. We find that mentors respond positively to both competence and relationship indicators but that relationship indicators are comparatively more important to them. We also find that intrinsic mentoring motivation compensates for lower relationship quality indicators (gender concordance) whereas prosocial mentoring motivation compensates for lower competence indicators (external recognition). We discuss the implications of these finding for theory and practice.

Keywords: startup mentoring; accelerators; conjoint experiment; self-determination theory; mentoring motivation

Introduction

Mentoring has increasingly become a standard service in startup accelerators, that invest significant resources in building and maintaining their mentor networks (Bergman & McMullen, 2021; Cohen, Bingham, et al., 2019; Cohen & Hochberg, 2014). Mentors are typically individuals with relevant experiences (e.g., entrepreneurs, investors, functional experts) committed to enhancing and supporting less experienced founders (Haggard et al., 2011; Kram, 1985; St-Jean, 2011). In particular, mentors are sources of knowledge (McKevitt & Marshall, 2015; Plummer et al., 2016) as well as social capital by providing access to business contacts (Bliemel et al., 2021). In addition, mentors also act as role models and a source of emotional support (Bosma et al., 2012; St-Jean & Audet, 2012).[9] Consistent with mentors' efforts, research has attributed increased entrepreneurial learning and performance to the informational and aspirational benefits derived from interpersonal relationships with mentors. For example, Ozgen and Baron (2007) show that mentoring increases founders' opportunity recognition whereas Assenova (2020) shows that founders paired with individuals that have a proven track record as mentors run startups that achieve higher revenue and profit growth, especially when founders had little entrepreneurial knowledge to begin with.

However, while accelerators go to great lengths to expose participating founders to as many mentors as possible, primarily because it is "really hard to predict who is going to have chemistry with whom" (Cohen, Bingham, et al., 2019: 839), mentors tend to be rather selective. In a recent study, Scott et al. (2020), for example, show that mentors of MIT's venture mentoring service, express interest in committing time to fewer than five percent of startups. As a consequence, mentors and mentees rarely find themselves in self-selected

[9] Within mentoring theory, role modeling and emotional support are commonly referred to as *psychosocial support* whereas providing access to social capital and advice is referred to as *career development* support (Kram, 1985; St-Jean, 2011).

relationships (i.e., match based on mutual preference) (Sanchez-Burks et al., 2017). This is unfortunate because the mutual attraction and desire to collaborate is lower when having an assigned mentor or mentee (Chao et al., 1992; Underhill, 2006) and a “bad fit” is the primary reason to terminate a mentorship (Sanchez-Burks et al., 2017). It is therefore important for founders that seek mentor support, and for accelerators that offer mentoring as a core service (Cohen & Hochberg, 2014), to understand the mentors' preferences.

To help us to better understand why some founders and not others are more attractive to mentors, we draw on mentoring literature from traditional, corporate settings (e.g., Haggard et al., 2011; Kram, 1985) on the one hand, and on the literature about investor selection of founders on the other (e.g., D. K. Hsu et al., 2014; Murnieks et al., 2011; Warnick et al., 2018). The corporate mentoring literature provides a solid base from which to theorize about mentee selection by mentors (e.g., Allen, 2004; Green & Bauer, 1995; Kram, 1985). We further use insights about investor decision making because investors often take on mentor roles (e.g., Mitteness et al., 2012; Politis, 2008; Sapienza, 1992), are a prominent group of startup mentors (e.g., Cohen, Fehder, et al., 2019; Hallen et al., 2020), and since investors similarly make judgements based on limited information they get from founders (e.g., Franke et al., 2008; D. K. Hsu et al., 2014; Svetek, 2022).

On that basis, we theorize that founders provide two broad categories of indicators to potential mentors. Whereas *competence indicators*, signal the founder's ability and convey the underlying viability of their startup, *relationship quality indicators* signal how smoothly the mentoring process is likely to unfold (Allen, 2004; Ciuchta et al., 2018; Svetek, 2022).We propose that competence and relationship quality can be signaled based on different attributes such as entrepreneurial experience (competence) and coachability (relationship quality). Because mentoring is an interpersonal and developmental relationship (Kram, 1985; St-Jean, 2011), we hypothesize that mentors primarily judge founders as potential mentees based on

relationship quality indicators (with competence indicators being secondary) and that relationship quality indicators can help compensate for the lack of competence (Allen, 2004). Finally, we recognize that mentors are driven by different motivations (intrinsic, prosocial, extrinsic) (Haggard et al., 2011) and hypothesize that these motives for mentoring relate differentially to the importance mentors attach to competence and relationship quality indicators.

To test these hypotheses, we conducted a metric conjoint experiment (e.g., Priem & Harrison, 1994) with a sample of 102 startup mentors reporting their willingness to mentor. In total, mentors evaluated 16 founder profiles (n = 1,632) that consisted of all different combinations of competence and relationship quality indicators. In addition, mentors completed a post-experiment questionnaire to assess their mentoring motivation. Our results indicate that competence and relationship quality indicators have a significant impact on mentors' evaluations of potential mentees. Among the attributes, coachability was the most important. Additionally, our findings suggest that the effects of these indicators are moderated by mentors' motivations. Specifically, intrinsic mentoring motivation was found to compensate for gender discordance, while prosocial mentoring motivation compensated for lower external recognition.

Our study makes contributions primarily to the emerging literature on startup mentoring (e.g., Agrawal et al., 2021; Scott et al., 2020). Although research has begun to acknowledge performance outcomes of having a mentor (e.g., Assenova, 2020), our study represents one of the first empirical examinations how a mentoring relationship forms to begin with and what are important contingencies for both mentees and mentors. We explicitly consider complementary and compensatory effects of different founder attributes across competence and relationship quality dimensions in mentors' selection (e.g., Cardon et al., 2017; Plummer et al., 2016; Svetek, 2022). While entrepreneurship research has explored

how startup founders are evaluated by sponsors such as accelerators and incubators (e.g., Bergman & McMullen, 2021) or investors (e.g., D. K. Hsu et al., 2014), mentors remain largely understudied. For example, unlike lessons about how investors select startups to invest in, where founder competence indicators reign supreme (e.g., Svetek, 2022; Warnick et al., 2018), we show that mentors, even if many of them are often investors too (Cohen, Bingham et al., 2019), prioritize relationship quality indicators, and in particular coachability (e.g., Ciuchta et al., 2018). Finally, we specifically consider mentor heterogeneity in mentee selection by incorporating motivational insights from corporate mentoring into startup settings (e.g., Allen, 2003, 2004; Janssen et al., 2014). This allows us to challenge the prevailing assumption that mentors always prefer to work with "stronger" mentees and their startup (Scott et al., 2020).

Theory and Hypotheses

A Model of the Decision to Mentor Startup Founders

The decision to mentor a startup founder represents a significant commitment to his or her personal and professional development (St-Jean, 2011). Startup mentors take time to offer feedback (Cohen, Bingham, et al., 2019), build ongoing personal relationships (Cohen, Fehder, et al., 2019), use their social networks to help founders (Krishnan et al., 2020), and may even make financial investments in the mentee's success (Kuratko et al., 2021). Given their commitment, mentors carefully choose the individuals they mentor. Potential mentees that indicate competence (i.e., necessary abilities, knowledge, and skills to effectively perform a task or role) and signal relational quality (i.e., effective of communication, mutual respect, shared goals, and a sense of collaboration) are in and advantageous position. This central role of competence and relationship quality was first put forward by Kram (1985) who conceptualized mentoring in corporate settings. Kram’s (1985) work remains insightful,

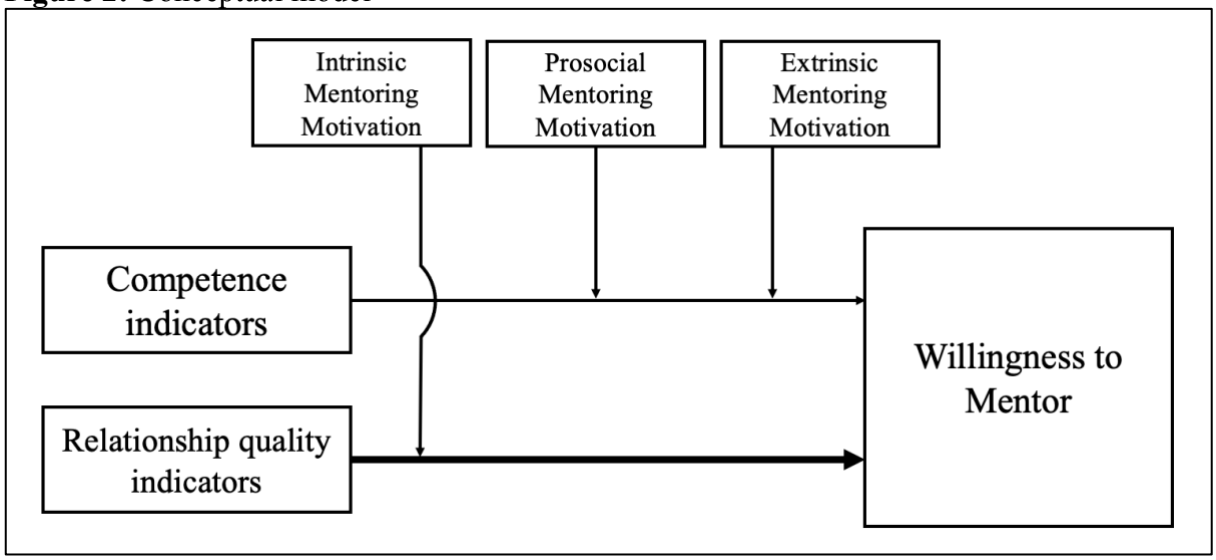
because – like in startup settings – mentoring is an interpersonal and developmental relationship between the mentor and his or her mentee (St-Jean, 2011). Since Kram's (1985) pioneering work, Allen (2004) and several others, have explained that mentors prefer competent mentees (e.g., those with proven track records) because these mentees are more likely take on and persist through challenging tasks, therefore signaling more rewarding relationships (e.g., Allen et al., 1997, 2000). In addition, choosing a mentee who consistently fails to meet deadlines or struggles to produce high-quality work could cast doubt on the mentor's ability to identify and develop talent, negatively impacting how others perceive the mentor's judgment and competency (Ragins, 1997b; Ragins & Scandura, 1994, 1999). Even very competent mentees will be difficult to mentor if they lack ability to get along with their mentors (Allen et al., 1997; Scandura, 1998) or prove unwilling to learn (Allen, 2004; Kram, 1985).

Competence and relationship quality indicators are also important signals to investors (D. K. Hsu et al., 2014; Sapienza, 1992; Svetek, 2022). Work on angel- and venture capital investor's investment policies is relevant because it involves selection under uncertainty with limited information (Matusik et al., 2008). In addition, these investors not only compose a large fraction of mentors within accelerators (Cohen, Bingham, et al., 2019) but also facilitate founder learning and improve startups more generally (Baum & Silverman, 2004). For example, research has shown that investors provide valuable insights and advice on operations and strategy (Garg & Eisenhardt, 2017; Pahnke et al., 2015), improve internal operations (Hellmann & Puri, 2002), and provide connections to customers, suppliers, and other investors that can assist with the learning and growth of a startup even further (Hallen, 2008; Hallen & Eisenhardt, 2012; D. H. Hsu, 2006). Overall, these activities aim to compensate for shortcomings in the founder's ability and social capital to stimulate growth

and financial return and are consistent with mentoring roles (Baum & Silverman, 2004; Mitteness et al., 2012).

Figure 2 graphically displays our core argument that both competence as well as relationship quality indicators inform the decision to mentor startup founders. In the following sections, we unpack this model and theorize that relationship and competence indicators complement each other and are moderated by specific types of mentoring motivations.

Figure 2: Conceptual model



Indicators of Entrepreneur's Competence and Relational Quality

Prior mentoring research in corporate settings reports that mentors prefer competent mentees. For example, Olian et al. (1993) show that mentors are more likely to support a potential mentee the better her past performance evaluations; Allen et al. (2000) show that mentors prefer mentoring high ability mentees over mentees in need of help; and Green and Bauer (1995) show that high-potential mentees, as opposed to low-potential mentees, receive more mentoring support. This is also corroborated by work on investor decision-making demonstrating that investors prefer founders that signal high competence via, for example, industry experience, entrepreneurial experience, or achieved education (e.g., Franke et al., 2006; D. K. Hsu et al., 2014; Warnick et al., 2018). Finally, consistent with this competence

preference, Scott et al. (2020) show that mentors generally prefer more experienced entrepreneurs and favor startups that already achieved more milestones.

However, competence is latent. That means, mentors, just like investors, possess incomplete and imperfect information about founder's competence and the startup's prospect and potential – especially before any actual products are produced or reliable reputational information become available (Navis & Glynn, 2011). Therefore, observable founder attributes act to reduce existing information asymmetries (Levy & Lazarovich-Porat, 1995) and provide new information that may change mentors' understanding and provide a way to make predictions about a potential mentorship (c.f., Busenitz et al., 2005).

First, *entrepreneurial experience* – the prior involvement with startup creation (Delmar & Shane, 2006) – is such an important attribute for signaling competence and, therefore, attractiveness of the founder as mentoring opportunity. While mentors cannot a priori ascertain whether entrepreneurs will be successful in the future, entrepreneurial experience cues expertise in a broad range of activities relevant in the entrepreneurial process (Delmar & Shane, 2006; Dimov, 2010), including the ability to identify and evaluate opportunities across many different markets (Bosma et al., 2012; Gruber et al., 2013). Consistently, entrepreneurial experience has been shown to increase entrepreneurial performance such that startups of more experienced founders are also more likely to obtain outside funding (D. K. Hsu et al., 2014), get access to employees (Lewis & Cardon, 2020); survive at higher rates (Ucbasaran et al., 2008), and achieve successful IPOs (Gompers et al., 2010). At the same time, entrepreneurial (in-)experience also indicates how much help founders require. For example, experienced entrepreneurs are more likely to turn to individual angel investors as compared to VCs partly because there is no longer a need to be associated with a VC as endorsement but also "because the management skills that the venture capitalists can contribute are no longer as helpful" (Lerner & Tirole, 2006: 1107).

Second, *external recognition* of the founder's startup – defined as endorsement by knowledgeable third parties (Navis & Glynn, 2011; Singh et al., 1986) – is another important attribute that signals the underlying quality of a mentors' target. Indeed, prior research has shown that existing ties to high-status partners such as prestigious accelerators or venture capital firms (Gulati & Higgins, 2003; Plummer et al., 2016; Stuart et al., 1999), as well as government research grants and startup awards (Islam et al., 2018; Petkova et al., 2008), can serve as indicators of mentee quality. These endorsements enhance the ability of startups to attract human capital (Bernstein et al., 2022; Hellmann & Puri, 2002); enable the formation of alliances (D. H. Hsu, 2006); and allow access to external funding (Plummer et al., 2016). Nanda and Rhodes-Kropf (2017), for example, suggest that investors tend to infer the true quality of a startup from the actions of other investors. Likewise, Cohen and Hochberg (2014) put forward the notion that accelerator participation validates the signaling value of startups in terms of quality and performance expectations because participation requires a thorough evaluation by a committee of experts, including staff, investors, and mentors. In addition, acceptance rates for accelerator programs are often low, with less than one percent of startups being accepted (also: Cohen, 2013; Plummer et al., 2016). In short, entrepreneurial experience, and external recognition are key indicators of the mentees' knowledge, skills, and abilities (i.e., competence) that are necessary for success in their entrepreneurial journey and thus valued by mentors (Allen, 2004; Svetek, 2022) We expect:

Hypothesis 1. Willingness to mentor is positively related to founder's competence indicators as expressed by (a) high as compared to low entrepreneurial experience and (b) high as compared to low external recognition.

Mentors also prefer potential mentees who signal the potential for a high-quality relationship or simply the ability to get along (Allen et al., 1997; Kuratko et al., 2021). Accordingly, we argue that mentors will be more willing to mentor if founders provide signals relevant for the quality of a future relationship. First, individuals prefer – and are

more likely to cooperate with – others who are similar to them (Byrne, 1971; Ertug et al., 2022; Toma et al., 2012). This similarity effect has found inroads into entrepreneurship in several studies on investor decision making including Murnieks et al. (2011) who show that investors prefer founders who similarly use effectual or causal decision-making processes and Franke et al. (2006) who find that investors prefer founding teams with similar experience and training (e.g., management versus technical) backgrounds. Likewise, a plethora of studies substantiates the empirical robustness of the similarity effect within corporate mentoring research including similarity in terms of readily observable demographics such gender and ethnicity (Allen et al., 2005; Ensher & Murphy, 1997), but also deeper level similarities including values (Eby et al., 2013; Turban et al., 2002), and even personality (Menges, 2016).

In particular, similarity in terms of mentor and mentees' gender (i.e., mentor-mentee gender concordance) has been highlighted as influential within corporate mentoring research (e.g., O'Brien et al., 2010; Turban et al., 2002; Wanberg et al., 2003). Specifically, during initiation of the mentoring relationships, gender concordance is readily assessable and removes interpersonal barriers such that it becomes easier to establish a connection. As mentors identify with their mentees, they begin to recognize qualities in the mentee that they themselves possess which helps to build trust and establish a positive rapport between the mentor and mentee (Humberd & Rouse, 2016; Ragins, 1999; Turban et al., 2002). For example, unlike individuals in gender concordant mentoring relationships, gender discordance means that other similarities need to be explored (e.g., hobbies, interests) first to achieve identification (Ragins, 1997a). In empirically elaborating on this idea, Ragins and McFarlin (1990) and Ragins and Cotton (1999), show that mentees in cross-gender relationships (e.g., woman/man; man/woman) are less likely than gender concordant mentees to engage in after work social activities with their mentors. Consistently, although moderated

by relationship duration, Turban et al. (2002) find that mentors in gender concordant relationships provide more exposure, sponsorship, and psychosocial support early on in the relationship. Finally, acknowledging these ideas, it is common that mentoring programs mandate same gender mentoring to increase comfort levels and avoid any potential liability through real or perceived effects of sexual harassment (e.g., Ensher & Murphy, 1997).

Second, efforts to incorporate external feedback are central to mentee's development more generally because feedback provides an indication of the extent of success or failure in meeting various goals and where corrective action is appropriate for their successful realization (Haynie et al., 2012). However, in order for feedback to be effective, it needs to be acknowledged and accepted to influence future action (Ashford et al., 2016; Ciuchta et al., 2018). Accordingly, Kram (1985: 44) urges mentors to direct their attention to prospective mentees "who want to learn and grow" while Young and Perrewé (2000) report that mentors are more satisfied with relationships where mentees are open to be advised and coached.

Within entrepreneurship, more specifically, entrepreneurial learning from feedback is attributed to founder's coachability (Marvel et al., 2020). In that context, coachability is generally defined as "the degree to which an entrepreneur seeks, carefully considers, and integrates feedback to improve his or her venture's performance" (Ciuchta et al., 2018: 868). For example, Kuratko et al. (2021) show that, more coachable entrepreneurs elicit more helping behavior (e.g., endorsements, willingness to share network) from their mentors and consequently report greater satisfaction and learning from the mentoring relationship. Likewise, several investor studies have demonstrated that if investors intend to become more involved with investees and take on mentor roles, the extent to which *coachability* is important as investment criterium increases (Ciuchta et al., 2018; Mitteness et al., 2012; Svetek, 2022). Finally, because accelerator programs have advice and mentoring at the heart of their business model (Cohen & Hochberg, 2014), participating founders are expected to

carefully evaluate mentor feedback (Cohen, Bingham, et al., 2019; Grimes, 2017) and pivot to ensure continued startup growth and success (McDonald & Gao, 2019). Therefore, we expect startup mentors to be particularly attentive to any indicators of barriers to a cooperative relationship with an entrepreneur.

Hypothesis 2. Willingness to mentor is positively related to founder's relationship quality indicators as expressed by (a) gender concordance versus discordance and (b) high versus low coachability.

Relationship Quality Indicators Exceed Entrepreneur's Competence Indicators

Overall, prior studies have taught us that mentors rely on multiple attributes across independent dimensions – including our aforementioned relationship quality and competence indicators – to judge potential mentees. In the context of corporate mentoring, aforementioned Kram (1985) and Green and Bauer (1995) first show that mentors prefer competent mentees. Allen et al. (2000) later extend that mentors prefer competent mentees with a high ability, over those who are in need of help. However, the measure used to assess ability included items such as "I picked this protégé because he/she showed potential" and "a lot of initiative" but also items such as "wanted to improve his/her skill" and "demonstrated a willingness to learn" (Allen et al., 2000: 276). Finally, although not formally hypothesized, Allen's (2004) results indicate that mentees signaling a high willingness to learn compared to high competence are in a better position to secure mentoring support. Together, these findings suggests that clear evidence on the hierarchical organization of attributes pertaining to competence and relationship quality dimension is limited. This lack of understanding is unfortunate because when accelerators set up initial meetings for mentors to decide whom to mentor, mentors are not only exposed to several potential mentees but put in a position to simultaneously observe several dimensions of cues holistically (Cohen, 2013).

We propose that in the context of startup mentoring relational quality indicators take primacy over competence indicators for two reasons. First, mentoring is a developmental

relationship in general (Kram, 1985). As such, it is premised on the idea that a mentor's expertise complements mentee's lack thereof (Haggard et al., 2011). In entrepreneurial settings, Ozgen and Baron (2007) show that older and more experienced founders can assist less experienced ones in effectively organizing industry information and identifying entrepreneurial opportunities. As a mentorship develops, more support resources become available to mentees (and mentors). For example, Kram (1985) states that development support (i.e., resources geared towards building competence) can be exchanged at any time in a mentorship including at its start, while psychosocial resources, predicate on mutual identification and trust which is built over time (also: Humberd & Rouse, 2016; Kram, 1983). In other words, development resources for startups, such as training in business skills, are readily available, but psychosocial support for the personal development of founders is less easily accessible and requires a strong relationship with a mentor (St-Jean, 2011).

Second, pivoting is central to a startups' growth and success (Camuffo et al., 2020; McDonald & Gao, 2019). However, for mentor's feedback to be conducive in guiding such development (Grimes, 2017), it must be accepted and influence subsequent action (Ashford et al., 2016) – or at least not be rejected without careful consideration (Bryan et al., 2017). Therefore, coachability is critical for mentoring to be developmental (Kuratko et al., 2021). Similarly, the corporate mentoring literature emphasizes that gender concordance is important not just for mentors selecting mentees but particularly to avoid dysfunctional relationships (Eby & McManus, 2004; Ragins & Cotton, 1999; Scandura, 1998). Ragins and Cotton (1999), for example, suggest that men may choose not to mentor women to avoid the risk of office gossip and innuendo that could damage their reputation or credibility while women may avoid mentoring men for concerns of being perceived too aggressive or not feminine enough. Therefore, unlike mentoring founders with lower competence that would simply require more effort, mentoring founders that signal lower relationship quality could

prove a waste of time altogether and may often even threaten mentors' reputation. We thus expect:

Hypothesis 3. Willingness to mentor is more strongly associated with relationship quality indicators than with founder's competence indicators.

The Moderating Role of Mentoring Motivation

Startup mentors are a diverse population including experienced entrepreneurs, investors, and others with relevant experience (Cohen, Bingham, et al., 2019; Hallen et al., 2020). Significant differences have also been observed in terms of mentors' motivation to support founders, with the purpose to give back, the aim to achieve recognition, mutual learning, and the desire to stay connected with the industry being primary drivers (Sanchez-Burks et al., 2017). These drivers echo work by Allen and her colleagues in corporate settings, suggesting that mentors not only exhibit different sets of motivations (extrinsic, intrinsic, and prosocial) but that these mentoring motivations also influence whom mentors select as mentees (Allen, 2003, 2004; Allen et al., 1997).

This important work primarily builds on self-determination theory (SDT) (for a review: Deci et al., 2017), which positions motivations for any behavior[10] on an intrinsic-extrinsic continuum reflecting the extent to which the behavior is autonomous or self-regulated (Deci & Ryan, 1985). On the one hand, *intrinsic motivation* "stems from the self, reflects the self and feels authentic" (Stephan et al., 2020: 5). Here, pleasure and enjoyment of the behavior drive effort (Bono & Judge, 2003; Waterman, 1993). Unlike intrinsic motivation which involves a primarily task-focused emphasis on the process of completing the work in the present, *extrinsic motivation* means individuals aim to achieve some form of tangible reward that is separate from the behavior (Deci & Ryan, 1985, 2000). Finally, along

[10] Applications of SDT include individuals' motives to work (Gagné & Deci, 2005); engagement in entrepreneurship (Shir et al., 2019); proactivity at work (Thomas et al., 2010); organization citizenship behavior (M. A. Finkelstein, 2011); and volunteering (Haivas et al., 2013).

this continuum, the *prosocial motivation* for a behavior emphasizes the meaning and purpose derived from the innate desire to benefit others that evolve around other-oriented values that can be internalized to varying degrees (e.g., Batson, 1987; Deci & Ryan, 2000; Grant, 2007). Unlike intrinsic motivation, prosocial motivation is outcome focused (as opposed to process focused) and aims to achieve such a meaningful outcome for others (as opposed to self which is the case in extrinsic motivation) (Grant, 2008).

Applied to startup mentoring, we propose that mentors' motivations influence the importance attached to competence and relationship quality indicators, respectively, and thereby moderate the impact of these indicators on whom mentors select as mentees. This builds on the notion that competence and relationship quality indicators signal mentoring outcomes that are unobservable a priori but evaluated differently depending on mentors' distinct motivation.

First, prior work suggests that the process of mentoring is a source of enjoyment to represent the "intrinsic satisfaction" associated with passing on insights and seeing others develop (Allen, 2003: 135). Although relational barriers to the mentoring process such as gender discordance may restrict identification of mentors with mentees and impede on the enjoyment of the mentoring process (Ragins & Cotton, 1991), we expect intrinsic mentoring motivation to buffer against indicators of lower relationship quality. Specifically, intrinsic motivation reflects individuals' "inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn" (Ryan & Deci, 2000: 70) and means the activity is internalized to a larger degree (Deci et al., 1994). The more internalized mentoring motivation becomes, the more mentors regard being a mentor as integral part of their identity (Deci et al., 1994, 2017) and experience mentoring as more vitalizing and robust to obstacles (e.g., Brunstein & Gollwitzer, 1996; Gollwitzer et al., 1982). For example, Matschke and Fehr (2015) show that high (but not low) internal motivation to become

member of a group, posits a valuable resource and buffers when newcomers face obstacles in identifying with their new group. As such, we expect high intrinsic mentoring motivation to be especially effective when mentors meet obstacles in pursuit of mentoring.

Hypothesis 4. Intrinsic mentoring motivation weakens the positive relationship between (a) gender concordance and (b) coachability on willingness to mentor.

Second, inasmuch as mentoring is not formally mandated, prosocial motivation towards helping others has a long tradition within corporate mentoring research (e.g., Aryee et al., 1996; Bear & Hwang, 2015). Indeed, Scandura and Schriesheim (1994: 1589) describe mentoring as "a personal, extraorganizational investment in the protégé by the mentor" whereas Mullen (1994: 276) states even more directly: "By acting as a mentor, one is performing prosocial behaviors." Empirical evidence confirms that individuals that score high on the trait of helpfulness are more likely to report having been a mentor and both traits of helpfulness as well as other-oriented empathy are positively related to a greater willingness to mentor others (Allen, 2003; Hu, Wang, et al., 2014). Not only is mentoring as helping behavior "typically prompted by contact with others who need help" (Grant, 2008: 49), it influences whom mentors decide to support. For example, one interviewee in Allen et al. (1997: 80) reported opting for weaker mentees because these mentees "looked like they could go further than they had if they had a little bit of help." Finally, based on these ideas, Allen (2003) suggests that prosocial motivation causes mentors to underestimate the cost associated with being a mentor and be more forgiving towards lower performing mentees. Therefore, we expect:

Hypothesis 5. Prosocial mentoring motivation weakens the positive relationship between (a) entrepreneurial experience and (b) external recognition on willingness to mentor.

Third, some mentors may be driven by external motives and support mentees because it is "part of their job" or "strokes their ego" (Janssen et al., 2014: 270). According to SDT, such extrinsic mentoring motivation means that mentoring occurs to achieve some form of

tangible reward that is separate from the mentoring activity (Deci & Ryan, 2000; Haggard et al., 2011). For example, entrepreneurship research has shown that mentors are well positioned to join startups of supported founders in a managing or board capacity (Cohen, 2013; Yusubova et al., 2020) or that mentors simply mentor because the accelerator management nudged them to help (Sanchez-Burks et al., 2017). Anecdotally, several mentors that we interviewed as part of this research project[11] openly stated that startup mentoring is a means to get "connected to interesting people which could lead to personal and business opportunities;" that mentoring is a "nice way to get to know and scout potential companies in which {own investment firm} could invest;" or that mentoring "is in my LinkedIn profile and it looks fantastic there." In other words, although mentoring in itself might not be enjoyable (i.e., intrinsic mentor motivation), it serves an important, purpose (e.g., job opportunity, investment vehicle, reputational benefits).

Here, we propose that more competent mentees (as compared to less competent mentees) are seen by mentors as more conducive to achieving such external purpose. Traditional mentoring theory has long established that mentors engage in relationships based on how this increases their chances of being associated with success. For example, Mullen and Noe (1999) show that mentee's competence is positively related to which mentors seek advice from their mentees, while Ragins and Scandura (1999) and Kram (1985) suggest that expected costs of being a mentor (e.g., time-investment, reputational concerns, poor performing mentee) negatively predict willingness to mentor. Translating these finding to mentoring in startup contexts, mentoring less as compared to more competent founders would mean mentors need to invest more time developing the founder, can expect lower payoffs,

[11] Before designing the current study and collecting data to test our hypotheses, we conducted seven preliminary interviews with startup mentors, accelerator staff, and program directors in order to explore mentor motivations and get better insights about what they seek in potential mentees. More details about these interviews appear below under "Research design".

and risk embarrassment if the founder and her business fails (Allen, 2003; Ragins & Scandura, 1999; Ucbasaran et al., 2013). Therefore, we propose:

Hypothesis 6. Extrinsic mentoring motivation strengthens the positive relationship between (a) entrepreneurial experience and (b) external recognition on willingness to mentor.

Method

Research design

Similar to studies on investor- (e.g., Murnieks et al., 2016), employee- (e.g., Lewis & Cardon, 2020), and entrepreneur decision making (e.g., DeTienne et al., 2008), we draw on a metric conjoint experiment to analyze the decision to mentor startup founders. This study was preregistered prior to the collection of any data (https://aspredicted.org/7CS_B9F). In our experiment, mentors engaged with "a series of judgments based on a set of attributes (cues) from which the underlying structure of their cognitive system can be investigated" (Shepherd & Zacharakis, 1999: 211). In contrast to complementary conjoint methods such as discrete choice experiments that ask respondents to select one out of a set of profiles, metric conjoint experiments require to judge or rate profiles on a metric scale (Priem & Harrison, 1994). This rating gradation in each profile, captured by our dependent variable *willingness to mentor*, allows to shed light on the importance of each attribute in mentors' decision-making (i.e., Level-1 attribute level), interactions of these attributes (i.e., Level-1 interactions) as well as cross-level interactions with characteristics of mentors (i.e., Level-2 mentor level) (Priem et al., 2004; Shepherd & Zacharakis, 2003).

In line with prior research in entrepreneurship, we employ a full-factorial, orthogonal design (e.g., Drover et al., 2014; Murnieks et al., 2016). Such a design includes 16 (2^4) unique profiles representing all possible attribute combinations and implies that zero correlation exists between conjoint attributes, meaning that issues of multicollinearity between attributes are thus excluded by design (Louviere, 1988). To keep the number of

decision tasks feasible, we replicated four randomly chosen profiles to analyze the respondents' test-retest correlation[12] (Patzelt & Shepherd, 2009; Shepherd & Patzelt, 2015). Mentors' decisions had a high degree of test-retest reliability (i.e., mean test-retest correlation of $r = .82$, $p < .001$, min = 0.81, max = 0.85), providing evidence that mentor responses are reliable (Aiman-Smith et al., 2002). In addition, to minimize the risk of order-effects, we randomized the order in which these 20 profiles were presented, and also created an additional version with a separate, randomly chosen attribute order. On the basis of a paired samples *t*-test we could not reject the null hypothesis as we found no evidence for order effects for willingness to mentor across these versions ($t(100) = .287$, $p = .775$) (Chrzan, 1994; Shepherd & Zacharakis, 1999).

Before participants started the conjoint experiment, they encountered an additional decision profile for practice purposes and were instructed to envision themselves making decisions about mentoring the presented founder. Further, we instructed participants to consider each profile independently and assume that mentee characteristics other than the attributes presented are constant across profiles (Holland & Shepherd, 2013; Patzelt & Shepherd, 2009). Finally, to maximize the ecological validity in analyzing mentor decision-making, we conducted seven preparatory interviews with mentors, accelerator staff, and program directors. These interviews allowed us to confirm the relevance of the attributes we used and informed us how to label and define them clearly, thereby ensuring that the criteria we include are both important to their mentoring decisions and presented in a clear manner. For instance, these preparatory interviews motivated us to use the term “startup experience”

[12] While some conjoint studies re-test all profiles, they often rely on few attributes or employ a fractional design including only a subset of all possible profiles (e.g., Kibler et al., 2017; Lewis & Cardon, 2020; Moser et al., 2017). Inconsistent responses in conjoint analyses are not a prevalent concern; they do not seem to arise in previous empirical studies, especially those involving time-constrained professionals who voluntarily decide to participate (e.g., Choi & Shepherd, 2004; Drover et al., 2017; Murnieks et al., 2011; Wood et al., 2014).

in place of "entrepreneurial experience" to maximize clarity and minimize potential confusion among the presented attributes (i.e., face validity).

Sample

Participants were contacted through two channels. First, we collaborated with a large international accelerator headquartered in the Netherlands which agreed to share our study invitation for mentors in their monthly newsletter. Second, we identified additional mentors from the same accelerator as well as another neighboring program via LinkedIn using the keyword "startup mentor" in combination with the respective accelerator name. In addition, we asked participating mentors to share the invitation to the experiment with other startup mentors in their network (for a similar approach see: Svetek, 2022). On the first page of the online questionnaire, all participants categorized themselves as startup mentors by agreeing to have actively and regularly supported startup founders. To thank participants for their time, after completing the study, they were all offered a 10 percent discount on a startup mentoring masterclass (conducted by one of the authors) as well as the opportunity to join a raffle for a free slot in that same masterclass.

In total, 112 experienced startup mentors, including some who had mentored hundreds of startup founders, completed the experiment. Out of the 112 mentors, nine indicated they do not wish us to use their data and were excluded from all analyses. In addition, five mentors failed an attention check prompting respondents to confirm their active participation by answering a question with a predetermined point on a Likert scale (Gummer et al., 2021). Instead of excluding these five mentors, we tested for careless responses by comparing against the rest of the sample, leading us to remove one mentor who flatlined ratings across all profiles. All other responses were retained. The final sample of 102 startup mentors represents a sample size satisfying common standards (Aguinis et al., 2013; Aguinis & Bradley, 2014) and is consistent with or exceeds many other conjoint studies following

similar designs (e.g., Fu & Tietz, 2019; *n* = 50; Svetek, 2022; *n* = 84; Warnick et al., 2018; *n* = 62). Twenty-three mentors were women, 78 men, and one mentor identified as non-binary[13]. The mean age of mentors in the sample was 44.10 years (*SD* = 9.51). Sixty-four percent of mentors reported entrepreneurial experience with 2.40 (*SD* = 2.09) (co-) founded businesses on average. Forty-eight per cent of the mentors had previously invested in startups; funding 2.98 (*SD* = 10.60) startups on average. Finally, mentors in our sample reported extensive experience with 19.84 (*SD* = 39.11) startups mentored on average.

Measures

Decision Attributes and Dependent Variable

Each conjoint profile consists of four decision attributes: entrepreneurial experience. external recognition (competence indicators), and coachability, as well as gender (relationship quality indicators) in either their "high" or "low" version (for gender levels referred to "woman" or "man"). We constructed profiles by varying the levels of each of these attributes until all possible configurations were included. Detailed definitions were provided to participants to ensure shared understanding of attributes and levels. Table 3 provides an overview of all attributes and their respective levels.

We assessed the likelihood that respondents would select the presented founder as mentee based on a single item adjusted from Murnieks et al. (2011): "Given the choice, what is the probability that you would mentor this startup founder?" Answers were keyed on a seven-point Likert scale ranging from 1 = "Very low" to 7 = "Very high" with a midpoint of 4 = "Average".[14] An example profile is shown in the Appendix A.

[13] We coded this mentor as "NA" for analyses pertaining to gender concordance.

[14] In a single condition (out of 16), "Low" and "Very low" answer options to the willingness to mentor item were temporarily mixed up, affecting 1.29% of all decisions and 21 participants overall. The error was swiftly corrected after we were alerted by one of the affected respondents. All recorded responses were carefully tested against responses to that profile which were not affected to the mix-up to ensure they were robust to this mistake ($t(100) = -0.23$; $p = 0.817$). In addition, our results were robust to excluding all 21 participants who had one profile affected.

Table 3: Description of founder attributes as used in the conjoint experiment

Attribute	Level	Description
Startup's external recognition	High	This startup has received **above average** external recognition and was **rated** at the top of its cohort by a panel of investors
	Low	This startup has received **below average** external recognition and was **not rated** at the top of its cohort by a panel of investors
Founder's startup experience	High	The founder has **prior** experience in starting up and developing new businesses
	Low	The founder has **no prior** experience in starting up and developing new businesses
Founder's coachability	High	The founder is **highly** receptive to feedback
	Low	The founder is **somewhat** receptive to feedback
Founder's gender	Woman	The founder is a **woman**
	Man	The founder is a **man**

Mentor-level Variables

We used a post-experiment questionnaire to capture mentor-level variables. Specifically, we measured mentors' gender to assess concordance with founders' gender as well as mentors' intrinsic, prosocial, and extrinsic mentoring motivation. Therefore, mentors completed the intrinsic and prosocial motivation scale developed by Grant (2008) as well as items of the value/usefulness subscale of the Intrinsic Motivation Inventory capturing extrinsic motivation (Deci et al., 1994; Ryan, 1982; Ryan & Connell, 1989). Each of these scales is strongly rooted in self-determination theory and has been widely applied in management and entrepreneurship research (e.g., Gielnik et al., 2015; Grant & Berry, 2011; Kibler et al., 2019; Shin & Grant, 2019). We note here that we selected four items of the extrinsic scale that were slightly adapted to be consistent with the intrinsic and prosocial scale and fit our research context (Gagné & Deci, 2005; Grolnick & Ryan, 1987; see also Appendix A for adaptions and results of confirmatory factor analysis). The scales opened with the question: "Why are you motivated to do your work as mentor?" and each item was keyed on a 1–5 Likert scale from strongly disagree to strongly agree. The intrinsic motivation

scale is composed of four items including “Because I find the work engaging” and “Because it’s fun” ($\alpha = 0.74$). The prosocial motivation scale is also composed of four items, including “Because I care about benefiting others through my work” and “Because I want to have positive impact on others” ($\alpha = 0.73$). Finally, the extrinsic scale included four items such as “Because I believe this activity could be of some value to me“ and “Because I believe doing this activity could be beneficial to me“ ($\alpha = 0.83$).

Control Variables

Following recommendations in the extant mentoring and investment literatures (Allen & Eby, 2003; L. M. Finkelstein et al., 2003; Franke et al., 2006), we controlled for mentor’s age and education level. We also controlled for mentors’ entrepreneurial (i.e., number of startups founded), investment- (i.e., number of startups invested in), and mentoring experience (i.e., number of startups mentored) because these experiences likely determine the basis for evaluating entrepreneurs and their startups (Allen & Eby, 2003; Ciuchta et al., 2018; Gruber et al., 2015).

Data Analysis

To account for potential autocorrelation in our nested data (i.e., mentoring decisions nested in individual mentors), we analyze data from the conjoint experiment using Hierarchical Linear Modeling (HLM) (Aguinis et al., 2013; Raudenbush & Bryk, 2002). HLM accounts for the variance at the decision- or task level *within* mentors (level 1) and at the individual level *between* mentors (level 2). For example, we expect founder’s competence (level 1 attribute) to be evaluated less critically by mentors higher as opposed to lower in prosocial mentoring motivation (level 2 characteristic).

We organized the data by decision level, dummy-coded all decision attributes such that “1” reflects a high level of an attribute and “0” reflects a low level of an attribute and centered all predictors prior to analysis (see Aguinis et al., 2013 for an application including

R code). Therefore, main-effect regression coefficients represent the preference for a high level of an attribute while interactions between level 1 and level 2 attributes (i.e., cross-level interactions) represent the preference for a high level of the task attribute when the mentor has a higher as opposed to lower respective mentoring motivation. We assessed gender concordance by varying founder gender (level 1 attribute: men/women) and asking mentors to report their own gender (level 2 characteristic) (Allen & Eby, 2003). We coded gender concordance as "1" if mentee and mentor gender are the same and "0" otherwise.

Although we do not include hypotheses regarding interactions of decision attributes, our approach allows us to conduct additional exploratory analyses including all attribute-level interactions. Interaction-effect regression coefficients represent the preference for high levels of two attributes simultaneously.

Results

Descriptive statistics and correlations between mentor-level variables are reported in Table 4. Following recommendations for conjoint studies with similar designs (e.g., D. K. Hsu et al., 2014; Murnieks et al., 2011), Table 5 reports results of the full model with main and interaction effects together.

First, we expected that mentors prefer founders who signal competence. In support of Hypothesis 1a, the main effect of entrepreneurial experience was positive and marginally significant experience ($b = 0.22$; $p < .10$). In support of Hypothesis 1b, the main effect of external recognition ($b = 0.54$; $p < .001$) was positive and significant at $p < .05$ level.

Second, we expected that mentors prefer founders who signal relationship quality (gender concordance, coachability). In support of Hypothesis 2a and 2b, both gender concordance ($b = 0.14$; $p < .05$) and coachability ($b = 2.72$; $p < .001$) were positively and significantly related with willingness to mentor. Interestingly, and not hypothesized, we also

found a main effect for gender indicating that, on average, mentors preferred to mentor woman ($b = 0.33$; $p < .001$). We discuss the implications of this finding and the importance of future research in this area in more detail in the Discussion section.

Third, to test Hypothesis 3, which suggested that relationship quality indicators (gender concordance, coachability) compared to competence indicators (entrepreneurial experience, external recognition) predict willingness to mentor more strongly, we compare regression coefficients. Of the four attributes, entrepreneur's coachability had by far the greatest impact on willingness to mentor entrepreneurs ($b = 2.72$, $p < .001$; 95% CI [2.47, 2.97]). In terms of relative importance, coachability was followed by the startup's external recognition ($b = 0.54$; $p < .001$; 95% CI [0.36, 0.72]), which was followed by entrepreneurial experience ($b = 0.22$; $p = 0.064$; 95% CI [-0.02, 0.46]), and finally gender concordance ($b = 0.14$; $p < .032$; 95% CI [0.02, 0.26]). Together, the importance of perceived relational qualities (as indicated by coachability and gender concordance) was 79.0%, whereas the importance of perceived competence (as indicated by external recognition and entrepreneurial experience) was 21.0%. Post hoc contrasts using Bonferroni adjustment, indicated that coachability was significantly more important to mentors in our sample than external recognition ($b = 2.10$; $t(96.4) = 12.73$; $p_{\text{Bonferroni}} < .001$); entrepreneurial experience ($b = 2.52$; $t(96.9) = 16.08$; $p_{\text{Bonferroni}} < .001$); and gender concordance ($b = 2.57$; $t(143) = 17.54$; $p_{\text{Bonferroni}} < .001$). Further, external recognition was more important than entrepreneurial experience ($b = 0.42$; $t(97.7) = 4.10$; $p_{\text{Bonferroni}} < .001$) and more important than gender concordance ($b = 0.47$; $t(186) = 4.33$; $p_{\text{Bonferroni}} < .001$). Finally, there were no significant differences between gender concordance and entrepreneurial experience ($b = 0.05$; $t(159) = 0.14$; $p_{\text{Bonferroni}} = 1.000$) in predicting willingness to mentor (see Figure 3).

Table 4: Mentor-level descriptive statistics and correlation matrix

Variables		*M*	Min	Max	*SD*	1	2	3	4	5	6	7	8	9	10
1	Willingness to mentor	4.30	3.00	5.81	0.59	–									
2	Intrinsic motivation	4.50	3.00	5.00	0.49	0.03	(0.74)								
3	Prosocial motivation	4.54	2.50	5.00	0.47	0.17†	0.19†	(0.73)							
4	Extrinsic motivation	3.73	1.25	5.00	0.75	0.12	0.15	-0.09	(0.83)						
5	Entrepreneurial experience (# startups founded)	1.53	0.00	10.00	2.03	0.04	0.10	0.06	-0.13	–					
6	Investment experience (# startups invested in)	2.98	0.00	100.00	10.60	0.03	-0.02	0.06	-0.01	0.08	–				
7	Mentoring experience (# startups mentored)	19.80	1.00	300.00	39.10	0.01	0.06	0.10	-0.01	0.40***	0.09	–			
8	Gender (man = 0, woman = 1)	0.23	0.00	1.00	0.42	-0.10	0.02	0.26**	-0.03	-0.14	0.12	-0.11	–		
9	Age (years)	44.10	24.00	74.00	9.51	0.00	0.05	-0.15	-0.30**	0.06	0.11	0.00	-0.22*	–	
10	Education[a]	3.59	2.00	5.00	0.76	-0.09	-0.10	0.03	0.08	-0.17†	0.03	0.00	0.22*	-0.12	–

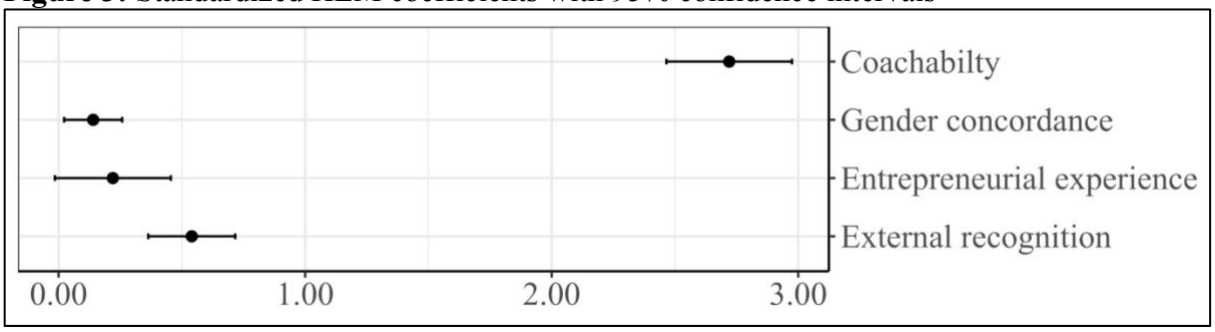
Note: Mentor-level $n = 102$; Cronbach's α (on Diagonal); [a] Education is measured with 5 categories from low to high: (1) intermediate vocational training to (5) doctorate degree.
*** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$, † $p \leq 0.1$ (two-tailed).

Table 5: HLM results (n = 1.632 decisions)

Dependent variable: Willingness to mentor	**Estimate**	**SE**	***t***	***p***	**Sig.**
Intercept	4.23	0.07	62.46	<.001	***
Mentor characteristics and controls					
Intrinsic motivation	0.08	0.13	0.63	.534	
Prosocial motivation	0.20	0.13	1.63	.107	
Extrinsic motivation	0.07	0.09	0.82	.416	
Entrepreneurial experience	-0.02	0.03	-0.73	.469	
Investment experience	-0.01	0.00	-1.04	.300	
Mentoring experience	0.00	0.00	0.47	.637	
Age	0.00	0.01	-0.54	.591	
Education	-0.13	0.07	-1.80	.075	†
Decision Attributes					
Experience	0.22	0.12	1.87	.064	†
Recognition	0.54	0.09	5.88	<.001	***
Gender	0.33	0.07	4.91	<.001	***
Gender concordance[a]	0.14	0.06	2.18	.032	*
Coachability	2.72	0.13	20.26	<.001	***
Level-1 (attribute-level) interaction effects					
Experience × Recognition	-0.43	0.08	-5.52	<.001	***
Gender concordance × Coachability	-0.01	0.08	-0.07	.946	
Experience × Gender concordance	-0.04	0.08	-0.55	.586	
Experience × Coachability	-0.24	0.08	-3.13	.002	**
Recognition × Gender concordance	0.14	0.08	1.77	.077	†
Recognition × Coachability	-0.01	0.08	-0.14	.892	
Level-2 (cross-level) interaction effects					
Intrinsic motivation × Gender concordance	-0.18	0.11	-1.67	.098	†
Intrinsic motivation × Coachability	-0.11	0.24	-0.46	.648	
Prosocial motivation × Recognition	-0.30	0.17	-1.74	.085	†
Prosocial motivation × Experience	0.24	0.23	1.07	.288	
Extrinsic motivation × Recognition	0.15	0.11	1.30	.198	
Extrinsic motivation × Experience	0.20	0.15	1.30	.196	

Note: [a] Gender concordance is 1 if founder mentee's (attribute) and mentor's gender are equal, 0 otherwise.
Level-1 variables were group mean-centered; level-2 variables were grand-mean centered.
$^{***}p \leq 0.001$, $^{**}p \leq 0.01$, $^{*}p \leq 0.05$, $^{\dagger}p \leq 0.1$ (two-tailed).
HLM=hierarchical linear modeling

Figure 3: Standardized HLM coefficients with 95% confidence intervals

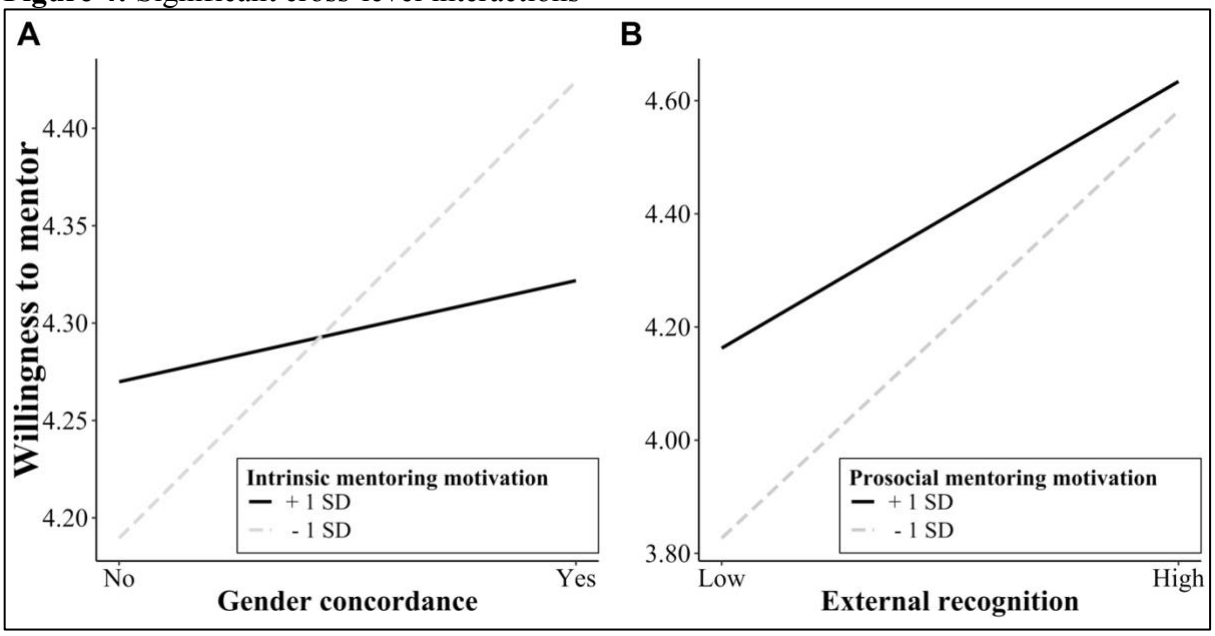


Finally, to test our Hypotheses pertaining to mentoring motivations, we interacted decision attributes entrepreneurial experience, external recognition, coachability and gender concordance with distinct mentoring motivations (intrinsic, prosocial, extrinsic). Figure 4 depicts all significant cross-level interactions. First, in support of Hypothesis 4a, the interaction between intrinsic mentoring motivation and gender concordance was significant at the $p < .1$ level and negative ($b = -0.18$, $p = .098$). This suggests that higher intrinsic mentoring motivation compensates for gender discordance (see Panel A in Figure 4). We found no such compensatory effect for intrinsic mentoring motivation and coachability on mentor's willingness to mentor (Hypothesis 4b) ($b = -0.11$, $p = .648$).

Second, we expected that mentors with higher prosocial mentoring motivation would place less emphasis on entrepreneur's competence compared to mentors with lower prosocial mentoring motivation. With regards to Hypothesis 5a, we found no significant interaction between prosocial mentoring motivation and entrepreneurial experience ($b = 0.24$, $p = .288$). However, in support of Hypothesis 5b, the interaction between prosocial mentoring motivation and external recognition was significant at the $p < .1$ level and negative ($b = -0.30$, $p = .085$). This suggests that higher prosocial mentoring motivation compensates for low external recognition (see Panel B in Figure 4).

Third, we expected mentors with greater extrinsic mentoring motivation to place greater emphasis on entrepreneur's competence. Although the effect points in the expected direction, we found no evidence that more extrinsically motivated mentors preferred entrepreneurs with high as opposed to low entrepreneurial experience (Hypothesis 6a: $b = 0.19$, $p = .211$) or external recognition (Hypothesis 6b: $b = 0.13$, $p = .241$).

Figure 4: Significant cross-level interactions

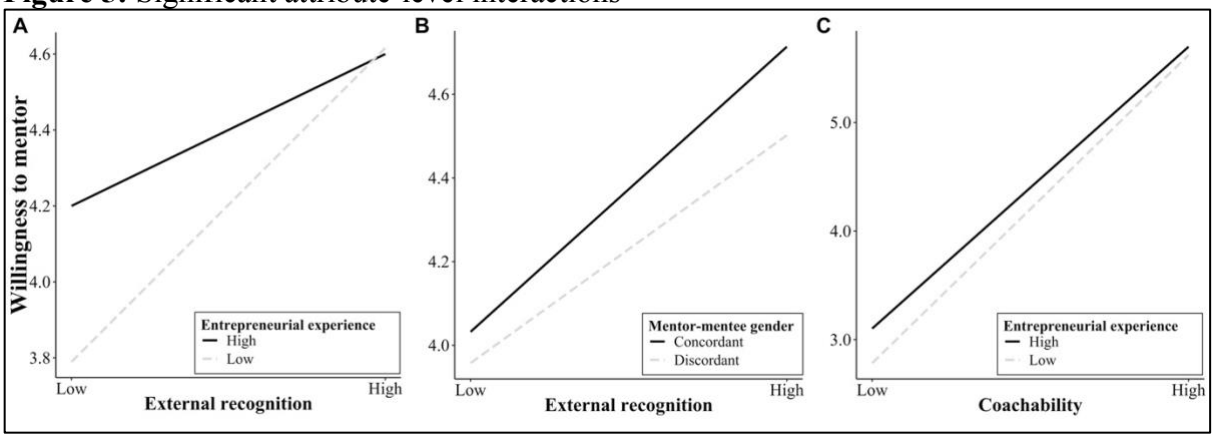


Note: [a]Interactions plotted in Panel A and Panel B significant at $p < .1$ level.

Because mentors are exposed to profiles including all decision attributes (at different levels) at once, we further conducted exploratory tests to examine how decision attributes interact. Understanding how mentors respond when competence and relational quality indicators point to the same or opposite directions is crucial. For example, a high level of one attribute could compensate (e.g., Nagy et al., 2012), strengthen (e.g., Cardon et al., 2017), weaken (e.g., Ozmel et al., 2013), or shape the interpretation of the other attributes (e.g., Drover et al., 2018). Figure 5 depicts significant interaction effects that emerged from our exploratory examination of attribute-level interactions.

In detail, we found a negative interaction between external recognition and entrepreneurial experience (b = -0.43; p < .001); a positive interaction between gender concordance and external recognition that was significant at the p < .1 level (b = 0.14; p = .077); and a negative interaction between coachability and entrepreneurial experience (b = -0.24; p = .002). While exploratory, these findings suggest that external recognition renders entrepreneurial experience obsolete as competence indicator (see Panel A in Figure 5); that gender concordance strengthens the effect of external recognition on willingness to mentor (see Panel B in Figure 5); and that high coachability can compensate for the lack of entrepreneurial experience (see Panel C in Figure 5). By contrast, we found no other attribute-level interaction effects indicating that mentors use these attributes separately rather than together when making mentoring decisions. To better understand the combined effect of all attribute combinations, we conducted a marginal means analysis that can be found in Appendix A (see Table 12).

Figure 5: Significant attribute-level interactions



Note: [a] Interaction plotted in Panel B significant at p < .1 level.

Discussion

In this paper, we combine theory from traditional mentoring contexts (e.g., Allen, 2004; Allen et al., 1997; Haggard et al., 2011) with insights from the literature about investor selection of founders (e.g., D. K. Hsu et al., 2014; Murnieks et al., 2011; Warnick et al., 2018) to develop

a theoretical argument explaining whom startup mentors like to mentor. We distinguished between competence indicators (entrepreneurial experience and external recognition) and relationship quality indicators (gender concordance and coachability). Using data from a metric conjoint experiment, which included 1,632 decisions made by 102 startup mentors, we show that mentors prefer experienced founders of startups that have received external recognition, and those who are gender-concordant and coachable. In addition, we show that relationship quality indicators are more important than competence indicators and that this effect is mostly driven by coachability. Finally, we find that mentoring motivations partly moderate the positive relationship between founder attributes and mentors' willingness to mentor, with intrinsic motivation buffering against gender discordance and prosocial motivation buffering against low external recognition.

In addition, although not hypothesized, our results also show that founder attributes interact in complex ways, such that (1) high external recognition compensates for a lack of entrepreneurial experience ; (2) high coachability compensates for a lack of entrepreneurial experience ; and (3) gender concordance strengthens the effect of external recognition.

Against our prediction, however, we found no interaction between intrinsic mentoring motivation and coachability nor between prosocial mentoring motivation and entrepreneurial experience, respectively. A potential explanation for these finding is that regardless how intrinsically motivated mentors are, coachability is a necessity for an effective mentorship (e.g., Kuratko et al., 2021). Further, while all mentors can support startups by drawing on their industry-, domain-, or functional knowledge and experience more broadly, not all mentors can compensate for a lack of entrepreneurial experience more specifically. Finally, contrary to research from corporate settings (Allen, 2004), we found no evidence that higher extrinsic

mentoring motivation amplifies the importance of competence attributes. In our sample, extrinsic mentoring motivation was significantly lower than intrinsic or prosocial mentoring motivations which may be due to startup mentoring occurring outside of organizational boundaries and being less appealing to mentors motivated by external factors (Ghosh, 2014; Ghosh & Reio, 2013).

Theoretical Contributions

Our research makes several contributions to emerging research on startup mentoring (e.g., Agrawal et al., 2021; Assenova, 2020; Scott et al., 2020). First, because mentor access is a quality differentiator between accelerator programs, a better understanding of mentors' selection processes is important (Bliemel et al., 2021; Sanchez-Burks et al., 2017). In our study, we provide insights into the relative importance of different attributes that startup mentors consider when deciding to mentor startup founders. Unlike previous studies, such as Scott et al. (2020), which determined mentors' willingness to mentor based on summaries of startups lumping these attributes together, we analyzed the attributes in a more nuanced way by carefully manipulating and assessing each attribute and its combinations at different levels. This is crucial because in accelerator programs, mentors often participate in "founder speed-dating" events, where they are exposed to multiple founders with differing attributes at once (Cohen, 2013; Cohen, Bingham, et al., 2019). The only study that directly compared mentee attributes in a corporate setting, shows that mentors tend to select mentees based on their perceived ability rather than their need for help (Allen et al., 2000). However, the study defined "ability" as a combination of factors, including competence (e.g., "showed potential") and relationship quality indicators (e.g., "demonstrated willingness to learn"). In addition to the relative importance of attributes, our study highlights several attribute-based compensation effects (Ozmel et al., 2013) such that "weaker" founders, who lack entrepreneurial experience, can still be appealing to mentors if founder's startups have

achieved external recognition. By the same token, founders can compensate for a lack of entrepreneurial experience by demonstrating coachability (Allen, 2004). An implication of these findings is that whenever mentors are exposed to several attributes, such as when participating in speed-dating events (e.g., Cohen, 2013), attribute-interactions should be taken into account.

Second, by leveraging insights from SDT (e.g., Deci & Ryan, 1985; Grant, 2008) and its application in the corporate mentoring literature (e.g., Allen, 2003; Hu, Baranik, et al., 2014; Janssen et al., 2014), we show that motivational dispositions shape the selection of mentees (Allen, 2004; Haggard et al., 2011). Thereby, we challenge implicit assumptions made by prior studies suggesting that mentors prefer to mentor “stronger” founders and their associated startups. For example, aforementioned Scott et al. (2020) have shown that startup mentors tend to prefer startups with a clear value proposition, achieved milestone progress, run by founders with significant human capital (Scott et al., 2020). This leads to the conclusion that "weaker" founders, who would greatly benefit from the complementary knowledge and experience of their mentor, may either not receive mentoring support, or have to rely on assigned mentors to whom they are not the top choice. By contrast, we recognize that decision outcomes can vary depending upon personal characteristics of the mentor. Indeed, "weaker" founders, who lack external recognition, for example, can still be an appealing mentoring opportunity for mentors who are high in prosocial mentoring motivation.

Moreover, prior research has suggested that startup mentors are driven by a variety of motivational concerns, such as the desire to give back, learn, and gain recognition from their mentoring activity (Sanchez-Burks et al., 2017). Our data corroborate this notion, as mentoring motivations were high in general within our sample, suggesting that motivated individuals tend to select into mentor roles. Additionally, for example, prosocial mentoring motivation correlated

(at $p = .085$ level) with willingness to mentor in our sample. Studies have speculated that "individuals high in prosocial tendencies would be less likely to perceive costs and more likely to perceive benefits associated with mentoring others" (Allen, 2003: 150). In an attempt to explain this observation, Allen et al. (1997) and Hu, Baranik et al. (2014) have argued that prosocial mentoring motivation means mentors expect fewer payoffs from the mentorship and are therefore more willing to support weaker mentees. We propose that mentoring motivation shapes the way mentors perceive and interpret social information. For example, mentors with high prosocial mentoring motivation were less concerned with founders' startups having achieved lower recognition by others. These results suggest that the selection and value-adding activities of startup mentors are interrelated, thereby extending the contribution to the literature on startup mentoring more generally (e.g., Assenova, 2020; Scott et al., 2020; St-Jean, 2012; St-Jean & Audet, 2012).

Finally, throughout the startup process, founders are often evaluated by a variety of third parties including government grant givers (e.g., Fisher et al., 2016), accelerators (e.g., Cohen & Hochberg, 2014), incubators (e.g., Bergman & McMullen, 2021), potential employees (e.g., Engel et al., 2022), and investors (e.g., Svetek, 2022). In this paper, we examine evaluations by a largely overlooked third party: startup mentors. In particular, we distinguish startup mentoring from startup investing by showing primacy of relationship quality indicators over indicators of competence. Although startup investors often take on mentor roles (Baum & Silverman, 2004) and make up a significant portion of startup mentors in accelerators (Cohen, Fehder, et al., 2019), they prefer competent founders over founders indicating quality relationships. For example, Warnick et al. (2018) find that, while openness to feedback (e.g., "entrepreneur is highly receptive to feedback from investors, the market, and other stakeholders") is comparable in

magnitude to entrepreneurial experience, it is less relevant to investors than other competence indicators such as domain experience. Similarly, Svetek (2022) shows that coachability (e.g., "the entrepreneur actively seeks the investors' feedback and takes it carefully into account") is less relevant to investors than market knowledge or industry experience. In contrast, our finding that startup mentors' uniquely focus on relationship quality indicators, specifically coachability, is in line with the developmental character of startup mentoring (e.g., Ozgen & Baron, 2007; St-Jean, 2011) and could be explained by the context in which startup mentoring occurs. That is, mentoring is a key service in fast-paced accelerator programs (Cohen & Hochberg, 2014), allowing mentors limited time to build relationships and therefore prioritize founders who signal quality relationships (Humberd & Rouse, 2016). Support for this idea comes from aforementioned Svetek (2022) who shows that the more investors participate in developing strategy, hiring decisions, and sharing their personal network with investees (i.e., taking on mentor roles), the greater importance they place on coachability in dimension in their investment decision.

Practical Implications

With respect to practical implications, our results are relevant to founders who seek mentor support and to accelerators and other entrepreneurship programs who offer such support as core service (e.g., Bergman & McMullen, 2021; Cohen & Hochberg, 2014). First, we show that there is a benefit for founders to demonstrate not only their competence but also indicate that potential mentorships will be of high relational quality when interacting with mentors. Prior studies have shown that entrepreneurs can send relational signals. For example, connecting with the audience during a pitch by responding with enthusiasm and awe to the audience feedback indicates collaborative potential and is associated with higher assessment (e.g., Elsbach &

Kramer, 2003) whereas founders that signal entrepreneurial passion can increase the employer attractiveness of their startups (e.g., Lewis & Cardon, 2020). Moreover, the results of our study show that founders can overcome shortcomings by strategically signaling their strengths. For example, although entrepreneurial experience is a critical attribute for founders (e.g., D. K. Hsu et al., 2014), we show that inexperienced founders can compensate for their lack of experience by demonstrating their collaborative potential through signaling coachability.

Second, by taking into consideration mentors' motivations, we also contribute to recruitment of startup mentors into accelerators (and related entrepreneurship programs) as well as to subsequent mentor-founder matchmaking processes. Mentors are a scarce resource in startup ecosystems (Bliemel et al., 2019, 2021) and accelerators invest significant resources into building and maintaining diverse mentor networks (Bergman & McMullen, 2021; Cohen, Bingham, et al., 2019). It is therefore important to allocate this valuable resource efficiently. For example, because not all accelerators are driven by for profit motives (e.g., Pandey et al., 2017; Pauwels et al., 2016) and may therefore want to select mentors who are not or less extrinsically motivated. In addition, given that different mentoring motivations mean mentors tend to be attracted to different types of founders, accelerators should tailor their matchmaking events to emphasize founder attributes that are most highly valued by the mentors from whom founders seek support. This approach can mitigate the potential downsides of formally assigning mentors to founders and allow for more mentor input in the matchmaking process (e.g., Chao et al., 1992; Sanchez-Burks et al., 2017).

Limitations and Future Research

Our study is not without limitations. First, scholars have repeatedly called for more conjoint experiments in entrepreneurship given their strength in depicting complex or intuitive

decision-making processes while overcoming concerns associated with research biases such as social desirability, faulty memory, and rationalization (Lohrke et al., 2010; Shepherd & Zacharakis, 1999). Nonetheless, conjoint experiments require a priori knowledge of the most critical decision attributes and trade-offs in their selection and operationalization. For example, consistent with mentoring theory (Haggard et al., 2011; e.g., Kram, 1985) and common practice in other studies on startup mentoring (e.g., Assenova, 2020; Ozgen & Baron, 2007), we operationalized mentoring as a one-on-one relationship. Nonetheless, because many startups are founded by teams (e.g., Harper, 2008), future research should explore which attributes should be broadly shared among co-founder or whether co-founders can balance each other's strengths and weaknesses to increase their chances of receiving mentoring support (Reese et al., 2021).

Second, we have categorized mentee attributes into competence and relational quality dimensions (Cardon et al., 2017; Svetek, 2022). However, in reality this categorization might be less precise raising concerns about content similarity. For example, although several studies substantiate the importance of gender and gender concordance versus discordance as precursor to relationship quality (e.g., Ragins, 1999; Ragins & McFarlin, 1990; Turban et al., 2002), gender could also be interpreted as a competence indicator for women founders who are almost always at a numerical minority in entrepreneurship (Guzman & Kacperczyk, 2019). As a result, women who are accepted by selective accelerators (Cohen, 2013) may be perceived as being particularly competent and successful startup founders. On the other hand, women might also signal a stronger desire for interpersonal relationships than men do (Janssen et al., 2014; Ragins & Cotton, 1993) and constitute a marginalized demographic identity in entrepreneurship causing others to provide more help and avoid prejudiced reactions (Kirgios et al., 2022). Therefore, we hope that future studies not only test different sets of attributes pertaining to founders'

competence and relationship quality indicators but also account for the potentially gendered nature of these attributes akin to research on corporate mentoring (McKeen & Bujaki, 2008; Ragins & Cotton, 1993).

Finally, the magnitude of coachability in relation to other attributes is noteworthy in our sample. Therefore, we urge future research to delve deeper into the nuances of coachability and its significance to mentors. For example, although Ciuchta et al. (2018) suggest that coachability may be a single dimension, their research also supports a two-factor solution. Herein, coachability encompasses not just how founders handle feedback, but also how actively they seek it out. This may be especially important for ad-hoc mentors who only offer advice occasionally (i.e., expert mentors), as it reduces the cost of providing feedback. On the other hand, being receptive to feedback may be more crucial for mentors looking to establish long-term relationships with their mentees (i.e., lead mentors) (Cohen, Fehder, et al., 2019; Kuratko et al., 2021). Future research could use a choice-based conjoint experiment that includes both aspects of coachability and a nuanced sample of mentors which differentiates between expert mentors and lead mentors (for a similar approach see: Gruber et al., 2015). This research could unpack why and when different facets of coachability are most effective in creating an attractive mentoring opportunity.

Conclusion

A better understanding of mentors' preferences is crucial given mentoring's impact on individual and startup outcomes and to determine "who gets a mentor." In this paper, we propose that mentors perceive founders through the lens of competence and relationship quality indicators. Both dimensions significantly contribute to mentors' willingness to mentor, with

relationship quality, particularly coachability, being of primary importance. Moreover, these dimensions are affected by mentors' motivations. Mentors who are more intrinsically motivated are more open to mentoring gender discordant founders whereas more prosocially motivated mentors assign less importance to mentoring founders of startups without external recognition. Our research highlights interactions and contingent relationships that provide deeper insight into how founders can compensate for their weaknesses in obtaining of valuable mentoring support.

— CHAPTER 4 —

Going Online: Peer Entrepreneur Networks in a Startup Accelerator before and during the COVID-19 Pandemic[15]

[15] This chapter is based on a paper that is under review at *Technovation* and has been presented at the 38th European Group for Organization Studies Colloquium (EGOS), 2022 (Vienna, Austria) and the 82nd Annual Meeting of the Academy of Management, 2022 (Seattle, US).

Abstract

A key value proposition of startup accelerators is the creation of social networks among participating entrepreneurs. The formation of these so-called "peer entrepreneur networks" is assumed to be strengthened by physical proximity within the accelerator, which facilitates the creation of trust and opportunities for informal, and often serendipitous, interactions. However, in response to the global spread of COVID-19, accelerators abruptly shifted their programs online, thereby allowing a rare opportunity to test the veracity of the assumption that physical proximity drives social connectivity. To understand how this shift affected peer entrepreneur networks, we compare longitudinal network data of two consecutive cohorts of the same accelerator: one offline-before, and one online-during, the COVID-19 pandemic. Drawing from the literature on physical proximity and interaction ritual theory, we show that in the online (compared to the offline) program, peer entrepreneur networks became less dense, entrepreneurs reached fewer peers via indirect connections, and clustering increased. We discuss contributions to theory on peer entrepreneur networks and startup accelerators.

Keywords: peer entrepreneurs, social networks, accelerators, online, COVID-19

Introduction

Startup accelerators – fixed-term, cohort-based entrepreneurship program(s) – aim to support entrepreneurial activity by creating a supportive learning environment (Bergman & McMullen, 2021; Cohen & Hochberg, 2014; Del Sarto et al., 2022; Dushnitsky & Sarkar, 2018). A key support element is the accelerator's ability to create "social capital surrounding entrepreneurial efforts" (Hochberg, 2016: 33), which is particularly critical to early-stage startups (Sullivan et al., 2021). To that end, accelerators use an array of formal and informal social events such as weekly dinners or guest speakers, often through a unique cohort approach (Cohen, 2013; Cohen & Hochberg, 2014). Besides creating network ties with actors outside the accelerator – such as customers, suppliers, investors, and service providers – (Del Sarto et al., 2022) accelerators can also add value by facilitating networks among the participating entrepreneurs. These peer entrepreneur networks can be powerful conduits for the exchange of resources that include knowledge, advice, and referrals (e.g., Amezcua et al., 2013; Hallen et al., 2020; Moritz et al., 2022; Schwartz & Hornych, 2010; Woolley & MacGregor, 2021).

With the onset of the COVID-19 pandemic and its associated public health and safety measures, most non-essential social activities in most countries, including activities pertaining to startup accelerator programs, abruptly shifted from face-to-face interactions to a digital environment. The literature emerging around interest in the impact of the COVID-19 pandemic on entrepreneurship highlights both negative and positive outcomes (Davidsson et al., 2021; Scheidgen et al., 2021; von Briel et al., 2018). The specific impact on peer entrepreneur networks in accelerators, however, remains unclear (Caccamo & Beckman, 2022). On the one hand, online accelerators mean that peer entrepreneurs can connect and collaborate using new digital tools, promising to facilitate frictionless, quicker, and broader tie formation (Nambisan, 2017; Smith et al., 2017; von Briel et al., 2018; Zahra, 2021). On

the other hand, scholars have called for more research to better understand the potential negative outcomes of using digital tools in online accelerator programs (Chan et al., 2022).

In this paper, we therefore study the effects of switching from an offline to an online accelerator program on the development of peer entrepreneur networks. The sudden and complete shift from offline to online cohorts under COVID-19, which is akin to a quasi-natural experiment (Bergenholtz 2021; DiNardo, 2016; Dunning, 2012), represents a rare and unique opportunity to test this prediction. Despite the promises of new digital communication and collaboration tools, we predict that online (compared to offline) accelerator programs exhibit weaker social connectivity and higher clustering among participating entrepreneurs. To support our arguments, we particularly draw from the literature on physical proximity (e.g., Krishnan et al., 2020; Festinger et al., 1950) and interaction ritual theory (e.g., Collins, 2004; Goffman, 1967), which predict that social connectivity will be hampered in the online environment due to the limitations for physical interactions and building trust-based relations (Ebbesen et al., 1976; Rivera et al., 2010; Roche et al., 2022).

To empirically test these ideas, we structurally compare social connectivity (e.g., density, reach) and clustering of these networks using social network analysis (Borgatti et al., 2013). In total, we draw on four waves of network data – from signup to Demo day – collected from a cohort of 89 entrepreneurs participating in the offline cohort and four waves of network data from a cohort of 72 entrepreneurs participating in the online cohort. We find that, despite no significant differences at the start of each cohort, peer entrepreneur networks become less connected in the online (compared to the offline) cohort as the accelerator program unfolds. This is reflected by three fundamental measures of social network connectivity: Lower density, lower reach, and higher clustering. To illustrate, in the offline cohort, only months before the COVID-19 pandemic, the average entrepreneur at the end of the program regularly interacted with about five peers. These peers, in turn, enabled focal

entrepreneurs to reach a significant proportion (45 percent) of the cohort network by three or fewer degrees of separation. One year later, amid the COVID-19 pandemic and the shift to an online accelerator, the average entrepreneur regularly interacted with only three peers, such connections were predominantly clustered within one's own venture team, and on average only 19 percent of the cohort could be reached in three steps.

Our study makes two core theoretical contributions. First, we add to the burgeoning literature on accelerator programs (Bergman & McMullen, 2021; Cohen & Hochberg, 2014; Dushnitsky & Sarkar, 2018; Hochberg, 2016) by introducing a structural social capital perspective (Adler & Kwon, 2002; Nahapiet & Ghoshal, 1998). Despite the accepted practice of co-locating entrepreneurs within accelerators (Cohen & Hochberg, 2014), in this literature, quantitative empirical studies using a social network analysis approach are almost entirely absent. We address this by employing a longitudinal survey design to collect data about social network ties among peer entrepreneurs in the same cohort at several moments in time during the accelerator program. In doing so, we do not only answer calls for more longitudinal studies of the social relations between peer entrepreneurs in accelerators directly (Bergman & McMullen, 2021), but more generally also inform future investigations of peer effects and learning in these kind of startup support programs (Caccamo & Beckman, 2022; Dushnitsky & Sarkar, 2018; Hasan & Koning, 2019; Moritz et al., 2022; Sullivan et al., 2021).

Second, we extend the relational dimension of social capital theory (Adler & Kwon, 2002; Nahapiet & Ghoshal, 1998) to account for the online context as a boundary condition to the development of social capital in accelerators (e.g., Davidsson & Honig, 2003; Elfring & Hulsink, 2003; Martinez & Aldrich, 2011; Slotte-Kock & Coviello, 2010; Vissa, 2012). While online accelerators mean that cohorts potentially embed more resources by recruiting from a geographically broader pool of startups (Carayannis & von Zedtwitz, 2005; Ford,

2020), our results indicate that the lack of physical proximity and face-to-face interactions in online accelerators (Caccamo & Beckman, 2022) means this potential is not fully exploited. Our findings are therefore informative to the growing literature on using digital innovations to support entrepreneurial ecosystems (Smith et al., 2017; Zahra et al., 2022), in particular the strand on virtual incubators and accelerators (von Zedtwitz & Grimaldi, 2006; von Zedtwitz, 2003) that aim to address physical distancing by creating digital closeness (Bacq & Lumpkin, 2020; Morse et al., 2007; Scheidgen et al., 2021). This line of research currently positions access to peer networks as a defining accelerator service, yet it fails to acknowledge how the shift online impedes network connectivity.

Theory and Hypotheses

Peer Entrepreneur Networks in Startup Accelerators

Having a solid peer network is one of the key factors influencing the emergence and successful development of nascent ventures (e.g., Cai & Szeidl, 2018; Lerner & Malmendier, 2013; Zuckerman & Sgourev, 2006). Ties to other entrepreneurs are conduits for the transmission of private information, advice, as well as influence, and gateway to resources that may otherwise be unobtainable or only at an inflated cost (Coleman, 1988; Granovetter, 1973; Zuckerman & Sgourev, 2006). Accordingly, social capital theory describes an entrepreneur's social capital as the "sum of the actual and potential resources embedded within, available through, and derived from the network of relationships" (Nahapiet & Ghoshal, 1998: 243). As such, social capital entails a "who you know" (Coleman, 1988) and is often equated with the structure of an entrepreneur's social network (Adler & Kwon, 2002; Galunic et al., 2012). In addition, social capital also entails a relational dimension that captures "how" entrepreneurs are connected to others. Here, investments in social relations generate goodwill available to entrepreneurs that can be mobilized to achieve certain goals

(Adler & Kwon, 2002) and include the specific set of norms and expectations embedded within a social network (Nahapiet & Ghoshal, 1998).

Accelerators, having recognized the value of ties among participating peer entrepreneurs as a source of knowledge, advice, referrals, and emotional support (Cohen, Bingham et al., 2019; Moritz et al., 2022; Schwartz & Hornych, 2010; Sullivan et al., 2021), actively foster the internal development of social capital (Nahapiet & Ghoshal, 1998) and communities or practice (Brown & Duguid, 1991). To that end, accelerators can use a myriad of activities and events to facilitate the formation and development of peer entrepreneur networks, especially within specific program cohorts. Some of these are formal (e.g., guest talks), while others are more informal (e.g., parties and other opportunities for exchange and serendipities encounters) (Caccamo & Beckman, 2022). There are two key mechanisms that are well-known to be important for tie formation: physical proximity and interaction rituals (Busch & Barkema, 2020; Krishnan et al., 2020; Roche et al., 2022).

First, accelerators' cohort structure means that entrepreneurs engage in their venturing process in the proximity of peers (Cohen & Hochberg, 2014). Co-located entrepreneurs that work alongside their peers are likely to develop social network ties because they have more opportunities to interact (Caccamo & Beckman, 2022; Del Sarto et al., 2022. Moritz et al., 2022; Rivera et al., 2010; Roche et al., 2022; Schwartz & Hornych, 2010). Mere physical proximity affects relationship formation (e.g., Bornstein, 1989; Festinger et al., 1950; Gieryn, 2000) because frequent face-to-face encounters provide more opportunities to observe and evaluate non-verbal communication thereby offering a clearer judgment of a person's trustworthiness and cooperative attitude (Preciado et al., 2012; Storper & Venables, 2004). In particular, unplanned or serendipitous encounters at the workplace (e.g., at the coffee machine) are important for inspiration and creativity (Allen, 2007; Busch & Barkema, 2020; Nijssen & Borgh, 2017). Prior studies indeed confirm that entrepreneurs co-located "under

the same roof" are more likely to collaborate (Bøllingtoft, 2012; Hansen et al., 2000; Lyons, 2000; Moritz et al., 2022), an effect that becomes stronger with the length of residency (Ebbers, 2014) and proximity in the co-working space (McAdam & McAdam, 2006).

Second, building on the idea that interaction facilitates connection, accelerators not only orchestrate unplanned interactions through office designs and seating arrangements but especially through planned social events (Cohen, Bingham et al., 2019; Krishnan et al., 2020). Events such as orientation weeks and icebreaker games include bonding rituals and are ideal to shape peer interactions because entrepreneurs are often unfamiliar with each other coming into these programs (Krishnan et al., 2020). According to interaction rituals theory, repeated face-to-face interactions across these formal events lead entrepreneurs to uncover their identity (Gur & Mathias, 2021; also: Fauchart & Gruber, 2011; Powell & Baker, 2014) and build an affective understanding for their shared situation, thereby laying the foundation for ongoing resource exchange and norms of reciprocity (Goffman, 1967; Huang & Knight, 2017; Molm et al., 2007). In addition, identification contributes to the formation of social capital because members adopt the values and standards of the group as reference point (Coleman, 1988; Gur & Mathias, 2021; Merton, 1968; Tajfel, 1982). This enhances the concern for collective processes and outcomes which increases the chances that the opportunity for resource exchange will be recognized and performed (Gedajlovic et al., 2013; Kramer et al., 1996; Nahapiet & Ghoshal, 1998). For instance, Cai and Szeidl (2018) show that monthly meetings make peer entrepreneurs become more trusting and ultimately willing to share private business contacts to critical customers and suppliers.

Taken together, concerted efforts from accelerator management, the shared experience of participation in these programs, as well as mere serendipitous face-to-face encounters due the co-location of entrepreneurs all seem to be sources for peer interaction as well as associated social capital.

Startup Accelerators in Times of COVID-19 and Social Connectivity Restrictions

Since its rapid onset in December 2019, COVID-19 has spread to every corner of the globe, with over 753 million confirmed cases and more than 6.8 million deaths as of January 2023 (WHO, 2023). To flatten the infection and hospitalization curves and ease the burden on healthcare systems, governments often mandated a range of policy measures such as travel bans, social distancing or work-from-home policies that transformed our globally connected world into stay-at-home economies almost overnight (Nummela et al., 2020). Accelerators responded by going online (Chan et al., 2022; Mascarenhas, 2020; Migicovsky & Friedman, 2020). To ensure networking and collaboration, while supporting dislocated entrepreneurs as well as more international and larger cohorts, accelerators employed digital technologies (Giones et al., 2020; Seibel, 2020; Zahra et al., 2022). Digital technologies have the potential to amplify peer networking by removing constraints of physical location and lowering the amount of time and resources to contact network ties (Agarwal et al., 2010; Nambisan, 2017; Smith et al., 2017; von Briel et al., 2018). For example, communication and collaboration platforms such as WhatsApp or Slack enable entrepreneurs to request support from peers any time and any place, while videoconferencing tools such as Zoom are designed to replace in-person meetings and thus reduce communication and coordination costs (Morse et al., 2007; Rippa & Secundo, 2019; Soluk et al., 2021).

However, despite immense technical aptitude and innovative approaches by all involved actors, as well as entrepreneurs' notorious flexibility in times of crises (Davidsson et al., 2021; Schumpeter, 1950; von Briel et al., 2018), there is reason to believe that social network connectivity among peers declines when accelerator programs move online. First, holding activities such as workshops online, as opposed to offline, negatively impacts social connectivity as the change in design hinders face-to-face interaction, a vital aspect of networking behavior (Gibson, 2020; Giones et al., 2020). Research on learning via social

networks (Caccamo & Beckman, 2022; Sullivan et al., 2021) suggests that the probability of seeking information from others hinges not only on knowing and valuing what others know but also on being able to gain access to that information at a reasonable cost (Borgatti & Cross, 2003). Because working digitally and remotely with others "requires developed social skills and being psychologically comfortable with such interactions to prevent this from increasing existing stress levels and anxiety" (Giones et al., 2020: 5) such a way of working is more costly. Consistently, Spigel (2021) argue that digital networking generally causes more challenges to entrepreneurs who become reluctant to acquire new contacts through digital means alone.

Second, by removing co-location, a core tenet of accelerator programs (Caccamo & Beckman, 2022; Cohen & Hochberg, 2014; Del Sarto et al., 2022), entrepreneurs should have fewer opportunity to connect. A plethora of research confirms that individuals who work in close physical proximity are more likely to share a bond (Brass et al., 2004; Festinger et al., 1950: Roche et al., 2022) because they are more likely to be exposed to, and interact with, one another which can help to establish emotional closeness, intimacy, and trust (Granovetter, 1973). For example, Roche et al. (2022) show that while startups co-located in co-working spaces are likely to adopt technologies from peers, this effect strongly decreases when the physical distance between their offices exceeds 20 meters. Similarly, research shows that entrepreneurs collaborate more frequently when accelerators employ "designs that emphasize peer interaction" (e.g., through open office space but also publicly held pitches and progress reports) over designs that "foster privacy" (Cohen, Bingham et al., 2019: 829). Hence, in online accelerators, due to the absence of a co-working space and physical proximity, entrepreneurs cannot "bump into someone" at the coffee machine (i.e., chance encounter) or share a car ride home after a day at work (Allen, 2007; Busch & Barkema, 2020; Krishnan et al., 2020).

Third, the online environment should be more disruptive to ritual chains that are formed as entrepreneurs move from one peer encounter to the next. These include formal events, such as meetings, as well as informal events, such as dinners that provide a sense of belonging and act as a source of high emotional energy (Collins, 2004; Krishnan et al., 2020; McAdam & McAdam, 2006). According to interaction rituals theory, a shared mutual goal, such as founding and running a new business, can generate identification and draw entrepreneurs to social interactions with peers (Collins, 2004; Krishnan et al., 2020; Weininger & Lizardo, 2019). However, these collective sentiments rely on observing others engaged in the same set of activities and will be reduced to memory unless they are constantly renewed in subsequent interactions (Collins, 2004). As online accelerators lack a physical meeting space, there should be less potential to observe and interact with peer entrepreneurs and thereby renew and strengthen ritual chains. Taken together, we hypothesize:

Hypothesis 1 (H1). *Network connectivity will be lower within the online cohort than within the offline cohort of a startup accelerator program.*

Finally, we expect that entrepreneurs in the online cohort form more clusters – tightly knit sub-groups that are more densely connected to each other compared to the rest of the cohort. That is because going online changes the opportunity structure for serendipitous encounters and removes large, boundary spanning events (e.g., Busch & Barkema, 2020; Weeden & Cornwell, 2020). Social network theory maintains that boundary spanning across organizational clusters is important for knowledge recombination, creativity, and innovation (Argote et al., 2003; Argote & Miron-Spektor, 2011; McEvily & Zaheer, 1999; Stam & Elfring, 2008). Given the uncertainty inherit in early-stage entrepreneurship (Denrell et al., 2015; Engel et al., 2017), events constitute a fruitful environment for actors to span such boundaries and serendipitously connect with others without a priori knowing the potential

value (Busch & Barkema, 2020). For example, Stam (2010) shows that participation in industry conferences enable entrepreneurs to become brokers within their industry's social network (Burt, 2010). However, if entrepreneurs work from home, they tend to fall back on existing connections instead of making new ones (Yang et al., 2021). For example, Bloom et al. (2023) found that remote work increases the tendency for employees to interact with their existing network, highlighting the significance of in-person office days for building and strengthening weaker connections (i.e., ties that span boundaries to connect distant clusters: Granovetter, 1973). In empirically elaborating on this idea, Weeden and Cornwell (2020) show that when Cornell university shifted to a hybrid model to curb COVID-19 (i.e., alternating offline and online attendance) and removed large major-spanning classes, student networks became sparser and more clustered because students mostly formed ties with peers in the same field of specialization. By these arguments, we hypothesize:

Hypothesis 2 (H2). *Network clustering will be higher within the online cohort than within the offline cohort of a startup accelerator program*.

Methods and Data

Research Setting

We test our prediction within the context of an early-stage university-based accelerator (Kaandorp et al., 2020; Souitaris et al., 2007) that mirrors private accelerators with several months of heavy workloads spread across practical workshops, lectures, mentor sessions, and the general demand of founding and running a new venture. As this specific program has existed for over a decade, those who sign up to join are usually well aware of what is expected of them. Whereas the cohort of 2019-2020 was offered offline, the cohort of 2020-2021 was offered completely online due to the COVID-19 pandemic. This quasi-natural experiment setting provides a unique opportunity to observe differences in peer entrepreneur

networks and isolate their source because both cohorts had similar selection criteria and target participant populations, and both kept an identical design with a series of fixed pedagogical elements. The primary distinction between these accelerators was the move from an offline to an online accelerator cohort.[16]

Data

Our data are from two different cohorts (offline vs. online cohort) of the same accelerator. Whereas the offline cohort was held in-person and originally used to show how social network ties to cohort peers can facilitate the transfer of entrepreneurial passion (Omitted for peer review, 2023), the online cohort was originally intended to enlarge the original data pool but had to be shifted to an online format due to the COVID-19 pandemic. Each cohort contains four measurement waves taken in six-week intervals. We followed an interactionist approach to generate social network data by instructing entrepreneurs to select cohort members they interacted with across informal social activities (Kleinbaum et al., 2015). In each (undirected) network we coded a tie if either entrepreneur within a dyad mentioned the other entrepreneur as a tie (Stam & Elfring, 2008; Wasserman & Faust, 1994). In line with other social network studies, we used a maximum of 10 names per entrepreneur to report on, with the aim to avoid respondent fatigue (Brace, 2018). The data cover all entrepreneurs who enlisted into the accelerator program and responded to at least two measurement waves[17] (Ployhart & Vandenberg, 2010). The final sample consisted of 161 entrepreneurs in total, of which 89 in the 2019/2020 offline cohort and 72 in the 2022/2021 online cohort.

[16] We acknowledge that other pandemic-related factors than the move online might have impacted the patterns of social interactions between people regardless of how accelerators structured their programs. We return to these alternative sources of variation when we discuss the limitations of our approach.

[17] Across both cohorts, we excluded 22 participants who did not meet this requirement. To test for non-response bias, we compared these 22 cases with the final sample based on demographics measured at Wave 1 (i.e., *sex*, *age*, *education*, and *entrepreneurial experience)*. There were no significant differences between respondents and non-respondents for all measures at enrollment.

Structural Differences Between Offline and Online cohort

Unlike earlier abrupt changes of accelerator programs early in the COVID-19 pandemic (Ford, 2020; Friedman, 2020), the second accelerator cohort we gathered data from took place several months into the COVID-19 pandemic from September 2020 to January 2021. Additional interviews held with the program managers confirmed that the online accelerator cohort followed the general structure of the offline cohort yet occurred during – and included design changes in response to – the COVID-19 pandemic. While program elements such as participant selection and signup remained unaltered, several other design features including the introductory ice breaker event, guest speaker attendance, as well as the Demo day were moved online. Finally, given fewer opportunities for direct oversight, the program managers decided to adapt educational elements to ensure entrepreneurs stay on track. Whereas educational content in the offline cohort was delivered across voluntary topic-specific seminars and workshops, in the online cohort content was delivered across weekly coaching sessions to which attendance was mandatory (see Appendix B for more details).

Measures

To offer an overview on network topology, we report the number of entrepreneurs who are part of the *main component*, *network diameter*, and *average geodesic distance*. First, the *main component* describes the maximal set of entrepreneurs in which every entrepreneur can reach every other entrepreneur via any path. Second, *network diameter* represents the shortest distance between the two most distant, yet still (indirectly) connected, entrepreneurs. Third, we calculate the *average geodesic distance* which is the distance between any two random entrepreneurs in the cohort that are directly or indirectly connected (Borgatti et al., 2013). We consider and average only the lengths of existing paths because geodesic distance is technically undefined for unconnected entrepreneurs (i.e., infinite or treated as diameter + 1).

To test for differences in social connectivity (H1) at the level of the network, we follow prior network studies to focus on measures of *network density* and *reach* (e.g., Ahuja, 2000; Hoang & Antoncic, 2003; McEvily & Zaheer, 1999). First, *density* is a measure of connectedness that describes the proportion of potential connections that are actual connections. Second, *reach* delineates the proportion of the cohort that is reachable within a certain number of steps (Borgatti et al., 2013). This statistic is to be interpreted as degrees of separation with $k = 1$ step being a direct connection, $k = 2$ steps a connection of a direct connection and so on (Borgatti et al., 2013; Everett & Borgatti, 1999). Insofar as reachable network proportions are only descriptive observations, we calculate geodesic k-path centrality scores for each entrepreneur and average these individual scores at the network level for each cohort at each wave (Borgatti & Everett, 2006).[18]

We also measure *clustering* (H2), which represents the number of ties connecting the focal entrepreneur's neighbors divided by the total number of possible ties between these neighbors (Watts & Strogatz, 1998). A coefficient close to zero indicates that the relative number of transitive relations involving that entrepreneur is low. A clustering coefficient of 1 indicates that this entrepreneur is involved in all possible transitive relations. We measure the overall level of clustering in the respective cohort networks as the average of clustering coefficients across all entrepreneurs. A network that is highly clustered means that entrepreneurs have a stronger tendency to form cliques or dense local neighborhoods, and therefore have fewer boundary spanning ties (Watts & Strogatz, 1998).

[18] Note that density and reachability in one step (i.e., $k = 1$ step reachability) are mathematically equivalent because, entrepreneurs one-step away are directly adjacent and density is defined as the number of observed ties (i.e., adjacent entrepreneurs) divided by the number of possible ties averaged across all entrepreneurs in the network.

Analytical Approach

To test our hypotheses, we draw on a series of independent samples t-tests to establish differences with regards to network level statistics at each wave and demographics at baseline, respectively.

Results

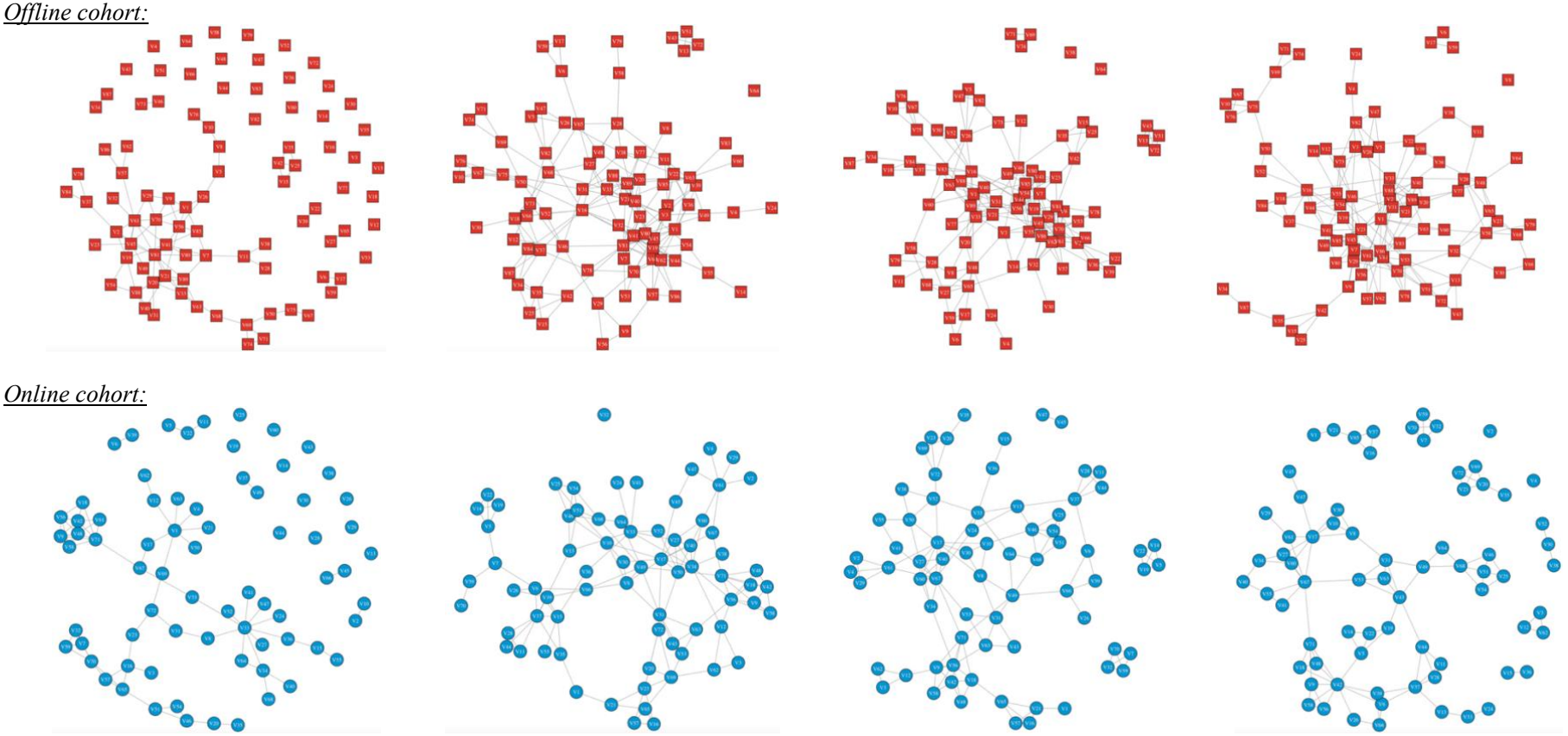
Table 6 captures both accelerator cohorts at enrollment and provides descriptive statistics with regards to the network topology and participants' demographics (upper half) as well as comparative network statistics (lower half). The networks across all four waves – from enrollment to Demo day – are depicted in Figure 6. The red squares in the top panel of Figure 6 represent entrepreneurs in the offline cohort, the blue circles in the bottom panel represent entrepreneurs in the online cohort.

Table 6: Accelerator cohorts at enrollment (Wave 1)

Measures:	**Offline**		**Online**		**Comparison**		
Network Topology							
Number of entrepreneurs	89		72				
Number of ties	94		75				
Components	34		18				
Entrepreneurs in largest component	52.8%		68.1%				
Diameter	12		14				
Geodesic distance	4.043		5.676				
Demographics	*M*	*SD*	*M*	*SD*	*t*(159)	*p*	*d*
Sex	0.74	0.44	0.68	0.47	0.85	.397	0.135
Age	20.99	1.15	21.15	1.27	-0.86	.393	-0.136
Education	0.72	0.45	0.65	0.48	0.90	.369	0.143
Entrepreneurial experience	0.21	0.41	0.24	0.43	-0.34	.734	-0.054
H1 *Network Connectivity*	*M*	*SD*	*M*	*SD*	*t*	*p*	*d*
Reach							
$k = 1$ (Density)	0.024	0.026	0.029	0.028	$t(159) = -1.23$	.221	0.195
$k = 2$	0.069	0.085	0.075	0.058	$t(155.24) = -0.51$	.609	0.078
$k = 3$	0.127	0.144	0.117	0.091	$t(151.23) = 0.53$	.600	0.078
$k = 4$	0.175	0.184	0.163	0.131	$t(156.61) = 0.47$	.636	0.073
$k = 5$	0.212	0.211	0.231	0.180	$t(158.56) = -0.64$	.525	0.099
H2 Clustering	0.434	0.358	0.382	0.404	$t(77) = 0.60$	.547	0.137

Note: Network measures normalized to ensure comparability. Coding for comparison at enrollment: [a] women = 0, men = 1; [b] no business education = 0, business education =1; [c] no founding experience = 0, previous founding experience. *p* refers to the p-value obtained from a one-tailed t-test*; d* refers to the effect size of the difference (Cohen's *d);*.Bold indicates significance at $p \leq .05$ (two-tailed).

Figure 6: Peer entrepreneur networks from enrollment to Demo day



Note: All nodes (entrepreneurs) are arranged using the Fruchterman-Reingold algorithm in *R v4.0.3* (R Core Team, 2020) utilizing the *igraph v1.2.6* (Csárdi & Nepusz, 2006).

Baseline Comparison at Enrollment

Wave 1, which is based on enrollment data, is different to other studies that compare network dynamics over time (e.g., Assenova, 2020; Uy et al., 2020; Woolley & MacGregor, 2021) in that this baseline data was gathered *after* individual participants signed up but *before* the program actually started. This is crucial as Wave 1 captures enrollment networks not only as benchmarks within each program (i.e., longitudinal) but also across the offline and online cohorts. That is, because enrollment occurred digitally and in identical fashion for both cohorts, we can safely assume that it is not affected by later program design choices. Further supporting our assumptions about similarities between the programs at Wave 1, the data indicates no cohort-differences along all observable demographic and network measures (see lower half of Table 6 for details). Both programs seem to have initially attracted comparable sets of entrepreneurs, thus greatly diminishing the risks involved in isolating the effects of differences in the accelerator design choices (offline vs. online) as those came in to play only from Wave 2 onwards.

Between Program Comparison

Waves 2 – 4 data capture the actual accelerator program stretching over 18 weeks. Several interesting patterns emerge when looking at the network topology for Waves 2 – 4 (Table 6 and Table 7). First, both the offline and online cohort show a spike in connectivity when the program begins (moving from Wave 1 to Wave 2) as indicated by an increase in the numbers of ties, decrease in the number of distinct components, larger proportion of entrepreneurs being connected to the main component, shorter network diameters, and shorter average geodesic distances. Second, while the trend towards increased connectivity strengthens throughout the duration of the offline cohort, it generally declines for the online cohort. Third, these trends are also reflected at the team level. Teams at the onset of both programs were comparably connected, but by the end of the program there is a sharp decline

in connectivity for online cohort teams such that, on average, each of these teams was connected to just one other team (in contrast to the offline teams that connected to more than two other teams on average).

With that descriptive pattern as our backdrop, we now turn to formally test network connectivity between programs using measures for density, k-step reachability, as well as clustering. These measures appear consistently in extant network research (Burg et al., 2021), and allow for formal comparison across networks based on statistical inference (Borgatti et al., 2013; Snijders & Borgatti, 1999).

Table 7: Results offline versus online accelerator cohort (Waves 2 – 4)

	Wave 2				**Wave 3**				**Wave 4**			
Measures:	Offline	Online	Comparison		Offline	Online	Comparison		Offline	Online	Comparison	
Network topology												
Number of entrepreneurs	89	72			89	72			89	72		
Number of ties	211	139			215	129			209	109		
Components	3	2			5	4			3	9		
Entrepreneurs in largest component	94.4%	98.6%			89.9%	86.1%			95.5%	66.7%		
Diameter	8	9			8	9			11	10		
Geodesic distance	3.423	4.110			3.460	3.926			3.735	3.970		
H1 *Network connectivity*	Offline	Online	*p*	*d*	Offline	Online	*p*	*d*	Offline	Online	*p*	*d*
Reach												
$k = 1$ (Density)	0.053	0.054	.528	0.011	0.054	0.050	.152	0.158	0.053	0.042	**.007**	0.380
$k = 2$	0.204	0.171	**.031**	0.286	0.192	0.137	**.001**	0.478	0.202	0.103	**< .001**	0.910
$k = 3$	0.475	0.366	**< .001**	0.526	0.421	0.302	**< .001**	0.563	0.452	0.187	**< .001**	1.372
$k = 4$	0.713	0.592	**< .001**	0.541	0.627	0.478	**< .001**	0.598	0.655	0.279	**< .001**	1.634
$k = 5$	0.836	0.760	**.009**	0.371	0.750	0.613	**< .001**	0.525	0.772	0.356	**< .001**	1.738
H2 *Clustering*	0.481	0.451	.710	0.093	0.555	0.606	.185	0.148	0.501	0.610	**.031**	0.315
Team network	Offline	Online	*p*	*d*	Offline	Online	*p*	*d*	Offline	Online	*p*	*d*
Number of teams	33	21			33	21			33	21		
Average team degree	2.788	2.238	.204	0.233	2.485	1.619	.059	0.445	2.546	1.00	**< .001**	0.986

Note: *p* refers to the *p*-value obtained from a one-tailed t-test (please see Appendix B for robustness tests including two-tailed t-tests); *d* refers to the effect size of the difference (Cohen's *d*). Bold indicates significance at $p \leq .05$.

Density

The percentage of pairs of entrepreneurs who are connected in one-step (i.e., $k = 1$) is a measure of *network density* (Table 7). That is, entrepreneurs one-step away are directly adjacent and density is defined as the number of observed ties (i.e., adjacent entrepreneurs) divided by the number of possible ties (n - 1) across all n entrepreneurs in the network. Entrepreneurs in both the offline as well as the online cohort could reach about five percent of their peers within one step on average, suggesting that direct ties are at first somewhat robust to program design differences. However, in support of Hypothesis 1, we find a decline in connectivity towards the end of the online cohort of the accelerator program at Wave 4. At that point, the offline cohort was denser as compared to the online cohort ($t(158.55) = 2.47$, $p = .007$, $d = 0.380$).[19] This means that at Demo day (i.e., Wave 4), the offline cohort connected 5.3% of all entrepreneurs whereas in the online program only 4.2% of connections were realized. While there are no studies measuring network densities of accelerator programs, single-digit densities are a common observation in larger networks such as university -, film school, or software industry networks (e.g., Batjargal, 2010; Ebbers & Wijnberg, 2019; Weeden & Cornwell, 2020). This means that a drop from 5.3% to 4.2% represents a network density decline of about 1.1% / 5.3% = 20.75% moving from an offline to an online accelerator.

Reach

As to indirect connections – an indicator of reachability, we find that entrepreneurs in the online cohort could reach fewer of their peers across all waves. This further supports Hypothesis 1. For example, entrepreneurs in the offline cohort could reach 65.5% of their peers within four

[19] Alternative testing based on 10.000 non-parametric artificial samples from the observed cohort networks that draws and replaces entrepreneurs at random while keeping the network structure intact (Snijders & Borgatti, 1999) mirrors our results: i.e., Wave 4 t(bootstrap) = 2.48; $p = .016$.

steps (Wave 4) but entrepreneurs in the online cohort could reach only 27.9% of their peers with the same number of steps ($t(159) = 10.54$, $p < .001$, $d = 1.634$). In other words, when comparing the offline to the online cohort, network reachability was cut in half. With a Cohen's d of 1.6, around 95% of entrepreneurs in the offline cohort will be above the mean of the online cohort in terms of indirect connections. Further, there is an 87.5% chance that an entrepreneur picked at random from the offline cohort will have more indirect connections than an entrepreneur picked at random from the online cohort at Demo day (Magnusson, 2021). Taken together, entrepreneurs in the offline cohort at Wave 4 can reach out (and obtain resources from) a significantly larger share of their peers by leveraging direct ties and the connections of these direct ties (Kim & Aldrich, 2005).

Clustering

We find no significant differences in clustering between the offline and the online cohort at Wave 2 ($t(142) = 0.553$, $p = .710$, $d = 0.093$) and Wave 3 ($t(147) = -0.90$, $p = .185$, $d = 0.148$). However, at Wave 4, in partial support of Hypothesis 2, the online cohort appears significantly more clustered than the offline cohort $t(143) = -1.87$, $p = .031$, $d = 0.315$. In other words, while we determined clustering for the online and offline cohort at enrollment as [$M = 0.43$ ($SD = 0.36$) and $M = 0.38$ ($SD = 0.40$)], respectively, suggesting a moderate tendency toward concentration of ties, clustering in the offline cohort increased by 16.3 percent to [$M = 0.50$ ($SD = 0.34$)] at Wave 4, whereas there was a substantial decrease in the proportion of connections spanning clusters in the online cohort as indicated by a 60.5 percent increase of the clustering coefficient to [$M = 0.61$ ($SD = 0.36$)]. More clustering at Wave 4 indicates that in the online cohort, entrepreneurs are exposed to a higher share of redundant information as the network exhibits

more structural holes and less network closure as compared to the offline cohort (Burt, 1995, 1997, 2004; Granovetter, 1973).

Robustness Tests

First, given network size differences between the cohorts ($n_{offline}$ = 89 vs. n_{online} = 72), we need to address the concern that larger networks may offer more potential ties to each entrepreneur. We calculate normalized *degree centrality* scores (Snijders & Borgatti, 1999; Wasserman & Faust, 1994), which measure the number of other entrepreneurs to which a focal entrepreneur is adjacent (Freeman, 1978). Whereas entrepreneurs before program start were comparably connected [M_{offline} = 2.113 (SD = 2.29); M_{online} = 2.08 (SD = 2.01); $t(159) = -1.25$, $p = .215$, $d = 0.198$], we find that entrepreneurs at Wave 4 in the offline cohort are connected to more alters [M_{offline} = 4.70 (SD = 2.78); M_{online} = 3.03 (SD = 1.72); $t(158.59) = 2.44$, $p = .016$, $d = 0.381$] even when controlling for different network sizes. Second, since our hypotheses were directional (i.e., we expected network connectivity to decrease, and clustering to increase, in the online accelerator), we used one-sided t-test. To ensure that this decision does not impact our results, we repeated all analyses with two-sided t-tests (see Appendix B: Table 15). The findings largely mirror our main analysis with the only exceptions being the proportion of entrepreneurs reachable in two steps at Wave 2 (significant at $p_{\text{two-sided}} = .062$ instead of $p_{\text{one-sided}} = 0.31$) and clustering at Wave 4 (significant at $p_{\text{two-sided}} = .063$ instead of $p_{\text{one-sided}} = 0.31$).

Finally, given that our setting starts with individuals signing up to – and forming teams in to the process of – the accelerator program, we collected data at the level of the individual entrepreneur. To corroborate our findings, we also evaluated network connectivity at the team level by determining team degree as the number of other teams connected to a focal team (Freeman, 1978). We coded a tie between teams when we observed at least one connection

between at least two entrepreneurs on their respective teams. We find no significant differences between offline and online at Wave 2 ($t(52) = 0.83$, $p = .204$, $d = 0.233$) and Wave 3 ($t(52) = 1.59$, $p = .059$, $d = 0.445$). However, at Wave 4, teams in the online cohort had significantly fewer ties to other startup teams [$M = 1.00$ ($SD = 1.05$)], compared to teams in the offline cohort [$M = 2.55$ ($SD = 1.95$); $t(50.86) = 3.77$, $p < .001$, $d = 0.986$]. These results are robust to the larger team network size in the offline- compared to the online cohort (e.g., Wave 4: $t(52) = 1.83$, $p = .037$, $d = 0.510$) (see lower panel in Table 7). The magnitude of the difference here is of note: Teams in the offline cohort were connected to more than twice the number of teams than in the online cohort, where entrepreneurs drastically restricted contact outside their own venture team.

Discussion

Despite the potential benefits of (new) digital communication and collaboration tools (Zahra et al., 2022; Chan et al., 2022), the effects of shifting to online accelerator programs due to COVID-19 are unclear (Caccamo & Beckman, 2022). In this study, we compared peer entrepreneur networks before and during the COVID-19 pandemic, which necessitated a design shift from offline to online accelerator programs. Resources accessed via these peer entrepreneur networks (e.g., knowledge, advice, feedback, referrals, and emotional support) encourage faster learning and development, and ultimately performance (Amezcua et al., 2013; Del Sarto et al., 2022; Grimes, 2017; Hallen et al., 2020; Yu, 2020). We argued that online (compared to offline) accelerator programs hamper the development of peer entrepreneur networks due to the lack of physical proximity (Krishnan et al., 2020; Roche et al., 2022) and weak interaction rituals (Collins, 2004; Goffman, 1967). Consistent with our hypotheses, we found that, when the accelerator shifted from an offline to an online program, social connectivity among entrepreneurs

within the program cohort decreased, while network clustering increased. Finally, this connectivity deficit became more pronounced as the accelerator program progressed over time.

Theoretical Contributions

Our study extends previous research on accelerators (e.g., Bergman & McMullen, 2021; Cohen & Hochberg, 2014; Dushnitsky & Sarkar, 2018; Woolley & MacGregor, 2021) and sheds light on the dynamics of peer entrepreneur relations within these programs (Amezcua et al., 2013; Hallen et al., 2020; Moritz et al., 2022; Schwartz & Hornych, 2010; Woolley & MacGregor, 2021). In so doing, we address the call to longitudinally investigate the social relations between peer entrepreneurs and their ventures embedded in accelerators (Bergman & McMullen, 2021). The findings indicate that both types of accelerator programs – offline (in-person) and online (digital) – are facilitators of the development of peer entrepreneur networks at first (Adler & Kwon, 2002; Carmeli & Azeroual, 2009; Nahapiet & Ghoshal, 1998). Inasmuch as peer benefits in accelerators (Moritz et al., 2022) accrue via the "social connections of entrepreneurs to other entrepreneurs" (Hallen et al., 2020: 397), our findings illuminate the network structure that entrepreneurs may use, and that serves as a source of learning and motivation (Cohen, Bingham et al., 2019; Woolley & MacGregor, 2021; Yu, 2020), especially among participants in the same accelerator cohort (Hallen et al., 2020; Del Sarto et al, 2022)

Our findings also speak to social digital innovations that emerged as facilitators of entrepreneurial activity during a global crisis (Bacq & Lumpkin, 2020; Davidsson et al., 2021; Scheidgen et al., 2021), in particular the strand of literature on virtual entrepreneurship programs (Felzensztein et al., 2010; Grimaldi & Grandi, 2005; von Zedtwitz & Grimaldi, 2006). Programs such as incubators, and more recently accelerators, have begun to incorporate online modes of operation (Ford, 2020; Nowak & Grantham, 2000), a trend that accentuated under COVID-19

(e.g., Chan et al., 2022; Gibson, 2020; Giones et al., 2020; Mascarenhas, 2020). To be conducive to development of social capital these programs must facilitate social interaction among resident (i.e., incubators) and participating (i.e., accelerators) entrepreneurs (Krishnan et al., 2020; van Rijnsoever, 2020). Digital innovations (e.g., online education, online mentoring) have been heralded for creating a form of digital closeness and remote social connection (Nambisan, 2017; Scheidgen et al., 2021; von Briel et al., 2018) that is likely to remain relevant beyond the COVID-19 pandemic (Aksoy et al., 2023; Bloom et al., 2022; Shepherd, 2020). However, despite the fact that digital technologies can facilitate peer networking by removing physical constraints, lowering communication costs, and creating "virtual embeddedness" (Rippa & Secundo, 2012; Morse et al., 2007; Nambisan, 2017; von Briel et al., 2018), our findings show that a spatially remote way of acceleration does not deliver all the benefits of in-person accelerators. At least in terms of social capital, there seem to be a "dark-side" to online accelerators that is not sufficiently mitigated by digital innovation and has yet to capture enough scholarly attention (Caccamo & Beckman, 2022; Chan et al., 2022).

In addition, we build on Granovetter's (1992) distinction of structural versus relational embeddedness to extend literature on entrepreneurial network formation (e.g., Elfring & Hulsink, 2007; Slotte-Kock & Coviello, 2010; Vissa, 2012). Unlike studies that highlight "network constructs rather than the theories underpinning network-based research" (Hoang & Antoncic, 2003: 172), we regard the network as a dependent variable (Slotte-Kock & Coviello, 2010). Our findings indicate that social connections between cohort entrepreneurs are an expression of how the design of an accelerator program gives opportunity to form social connections (Hasan & Koning, 2019; Krishnan et al., 2020). The online cohort entails less potential for peer interaction which means entrepreneurs are less likely to form network ties (Hansen et al., 2000; McAdam &

McAdam, 2006; Tötterman & Sten, 2005). In other words, online cohorts embed less structural social capital (e.g., a less dense and more clustered network configuration) through which knowledge can be exchanged (Caccamo & Beckman, 2022).

Even though the precise mechanisms could not be tested in our study, there is ample reason to assume that the online cohort embeds less relational social capital also (e.g., trust, norms of reciprocity, identification). Essentially, new connections involve uncertainties that may only be resolved after repeated interactions (Nahapiet & Ghoshal, 1998). Repeated interactions provide opportunities for entrepreneurs to observe and interpret each other's behavior and gauge non-verbal communication, particularly about emotions, cooperation, and trustworthiness to ultimately strengthen a relationship (Podolny, 1994; Storper & Venables, 2004). More frequent encounters in offline accelerators, in that sense, act as the spark that lights the fire of reciprocity (Engel et al., 2017). Research on incubators and accelerators, consistently, shows that the closer entrepreneurs are situated in space, the higher the likelihood of tie formation because closeness increases the chance of (often serendipitous) social interaction (Busch & Barkema, 2020; Nijssen & Borgh, 2017; Roche et al., 2022).

By removing co-location (Cohen, 2013) and moving planned social events (e.g., introduction week, icebreakers and social mixers) online, online accelerators offer lower chances for cohort members to "recognize their common fate as entrepreneurs" (Krishnan et al., 2020: 43). That is because fewer opportunities to observe, and interact with, peers undermine bonding rituals and associated identification processes rely on constant renewal through observation (Collins, 2004). For example, Cohen, Bingham et al. (2019) find anecdotal evidence in that decreased interaction – caused by designs such as private versus public progress reports or startup pitches – negatively impacts identification, integration, and transparency which impairs

peer learning and results in less refined business models. As a downstream consequence, the lack of mutual identification and trust could reduce the comfort level for entrepreneurs to seek feedback, as they are more susceptible to fear of criticism and embarrassment (Edmondson, 1999).

Practical Implications

Our findings have implications for entrepreneurial support programs such as accelerators, incubators, science parks, or co-working spaces as well as entrepreneurs, both in general (Bergman & McMullen, 2021) but also as participants in these programs (Woolley & MacGregor, 2021). First, insofar that COVID-19 necessitated the shift online, it is no longer a question of *whether* online entrepreneurial programs can deliver the promise of a quality education and support but rather one of *how* they may do so. Our findings indicate that program managers may want to consider the implications of an online program to peer entrepreneur networks and try to come up with ideas to buffer against negative effects. For instance, the unplanned chance encounters that face-to-face social events accommodate constitute a great source of inspiration and non-redundant knowledge (Allen, 2007; Burt, 1997, 2004; Busch & Barkema, 2020). For instance, accelerators that recognize the value of these random encounters and how they might be mitigated by a move online, can try to implement technological applications such as *Coffee Roulette* (https://coffee-roulette.com) to randomly connect peer entrepreneurs and create shorter paths within the cohort. Perhaps these, or comparable tools, can be drawn upon to offset some of the strain online designs have put on peer entrepreneur networks.

Second, entrepreneurs have to decide between a plethora of support programs including organized peer networks (Chatterji et al., 2019; Ho & Pollack, 2014), incubators (Ebbers, 2014;

van Rijnsoever, 2020), accelerators (Cohen & Hochberg, 2014; Dushnitsky & Sarkar, 2018) as well as their digital imitators (Carayannis & von Zedtwitz, 2005; von Zedtwitz & Grimaldi, 2006). In selecting between these alternatives, entrepreneurs compare the expected value each of these programs offers (Hallen et al., 2020; Schwartz, 2013). Using a network lens might help to delineate different programs because not all types of resources adhere to the same flow mechanism and different network structures may be differently capable to support resource flows of all kinds (Borgatti, 2005). For instance, our study implies that while experienced entrepreneurs with established networks may still derive enough value from participation in online incubators or accelerators, nascent entrepreneurs with underdeveloped networks may be better advised to opt for offline programs (Hallen, 2008).

Limitations and Future Research

This study has some limitations as well as suggestions for future research. First, we did not measure the performance implications of the differences in network structures we observed. Still, overwhelming empirical evidence point to larger and better-connected networks as more beneficial to startup performance because they provide broader resource access (Patel & Terjesen, 2011; Stam et al., 2014). Especially for early-stage entrepreneurs, social contacts are an important channel to gain access to information, customers, suppliers, and financial means (Bøllingtoft, 2012; Greve, 1995; Johannisson, 1986; Sullivan et al., 2021). In, addition, early-stage entrepreneurs typically have underdeveloped networks (Hallen, 2008) and should therefore be far from any point of diminishing returns or ceiling effect associated with managing extensive networks (Burg et al., 2021; Mariotti & Delbridge, 2012; Uzzi, 1997). Thus, we encourage future research to comparatively study both networks and their performance implications for startups participating in online accelerators. For instance, a matched samples approach could contrast

network- and performance data of offline and online accelerated startups at fixed intervals after graduation (e.g., Hallen et al., 2020).

Second, there are limitations related to how we generated social networks in this study. In line with several other network studies, we followed a binary approach by assessing if a connection between peer entrepreneurs was present or not (Feiler & Kleinbaum, 2015; Kleinbaum et al., 2015; Lomi et al., 2011; Stam & Elfring, 2008). Following the argument originally developed by Granovetter (1973), the dyadic relationship between entrepreneurs can also be depicted by different dimensions of tie strengths which in turn mean a complementary set of resources or include various information about the modality or content of a communication (e.g., whether the relationship included explicit contracting, exchange of feedback, emotional support, etc.). To transcend this limitation, future research, instead of measuring *if* the shift to online accelerators affects social networks, should assess in *how far* online networks are different. For instance, next to causing entrepreneurs to connect less (i.e., as indicated by lower network density), entrepreneurs may have connected differently (i.e., less tightly) due to the artificial character and technical challenges associated with contact via digital means alone (Prusak & Cohen, 2001; Spigel, 2021).

Finally, the COVID-19 pandemic has undoubtedly disrupted so many aspects of entrepreneur's social, emotional, and economic lives that its broad scope might be impactful to peer entrepreneur networks and embedded social capital beyond the specific accelerator design change from an offline to an online cohort. Entrepreneurs experience financial pressure from reduced sales, but also uncertainty related to managing staff and relationships to key partners and investors who are equally engaged in adopting to COVID-19 (Kuckertz et al., 2020; Kuckertz & Brändle, 2021). Therefore, we cannot exclude the possibility that resulting uncertainty and

anxiety extended into the accelerator setting and affected networking either independently or in conjunction with the effect of moving the accelerator online. However, in light of the generally observed limitations on peer-to-peer interaction in educational online contexts even pre-pandemic (e.g., Haythornthwaite, 2000; Saqr et al., 2018; Shu & Gu, 2018), we believe the move to an online accelerator as a design change (versus just pandemic driven) to be the primary driver for the effects we observe for network connectivity.

Conclusion

In response to the COVID-19 pandemic, startup accelerators shifted their programs online. We studied how this move has impacted peer entrepreneur networks by comparing longitudinal network data of two consecutive cohorts of the same startup accelerator. We find lower connectivity and higher clustering in the online (compared to the offline) program. This highlights the negative impact of "going online" on the formation and growth of these valuable peer networks, which rely on physical proximity, in-person events, serendipitous encounters, and social interactions for network formation and resource exchange.

— CHAPTER 5 —

Network to Passion or Passion to Network? Disentangling Entrepreneurial Passion Selection and Contagion Effects among Peers and Teams in a Startup Accelerator[20]

[20] This chapter is based on a paper that has been accepted for publication at *Journal of Business Venturing*.

Abstract

Entrepreneurial passion is socially contagious. However, do entrepreneurs also select whom they interact with based on passion similarity? The complex interdependencies between social networks and entrepreneurial passion remain undertheorized and empirically puzzling. Using a stochastic actor-oriented model (SIENA) and four waves of panel data, we test hypotheses about the co-evolution of social networks and entrepreneurial passion during a 5-month startup accelerator program. We find that (1) peer entrepreneurs establish social ties based on a shared passion for founding; (2) that passion for founding is socially contagious; and (3) that passion for founding is more contagious among members of startup teams than across other peer ties. Surprisingly, none of these effects are significant for passion for inventing. We discuss the theoretical, empirical, and practical implications of these findings.

Keywords: entrepreneurial passion, social networks, peer selection, social contagion, stochastic actor-oriented model, SIENA

Introduction

Empirical evidence is mounting that entrepreneurial passion—intense positive feelings for specific entrepreneurial role identities—is not only an important predictor of individual, team, and venture level outcomes (Boone et al., 2020; Cardon & Kirk, 2015; Santos & Cardon, 2019) but that it is also socially contagious: passion can transfer from one person to another (Cardon, 2008). For instance, entrepreneurs can transmit their passion to employees (Hubner et al., 2020) as well as investors (Davis et al., 2017), and members of a new venture team can experience passion convergence over time (Uy et al., 2021). Taken together, these studies advance a more socially embedded conceptualization of passion and effectively challenge earlier views of passion as a static intraindividual construct (Cardon et al., 2013; Murnieks et al., 2020).

As scholars show more interest in how patterns of social relationships are central to our understanding of entrepreneurial passion, there is a need to recognize that these patterns can also be represented and modeled by social networks—sets of actors linked with sets of ties that, together, yield a particular social structure (Borgatti & Halgin, 2011). To date, the interdependencies between entrepreneurs' social networks and their passion not only remain undertheorized, the relevant studies also lack the methodological tools with which these interdependencies can be empirically examined (Steglich et al., 2010; Snijders et al., 2010). For instance, that passion converges among team members on a new venture tells us something about the capacity of social networks (e.g., teams) to shape entrepreneurial passion, but it reveals nothing about how passion might have shaped the development of these networks to begin with (e.g., similarly passionate entrepreneurs select into the same team). This tendency to seek the company of like-minded others—known as homophily selection—is one of the most robustly documented social phenomena (Ertug et al., 2022; Lawrence & Shah, 2020). Even if such co-

evolutionary processes were to be considered theoretically, the analytical tools commonly used in studies of passion are not specifically designed to disentangle homophily selection from social contagion effects.[21]

Clearly, social dynamics are extremely relevant to investigations of both homophily selection and social contagion (Knight et al., 2019; Lazar et al., 2020). Beyond their fellow co-founders, entrepreneurs also interact with peers who are members of founder networks (Collewaert et al., 2016; de Mol et al., 2020); peers in parallel industries (Zuckerman & Sgourev, 2006); and peers in entrepreneurship training programs (Gielnik et al., 2017), startup competitions (Boone et al., 2020; Foo et al., 2005), or startup accelerators (Cohen, Bingham et al., 2019). To the extent that other entrepreneurs are a valuable source of information, knowledge, resources, and motivation (e.g., Cai & Szeidl, 2018; Eesley & Wang, 2017; Lerner & Malmendier, 2013) they are also likely to play a vital role in how entrepreneurial passion is developed and manifested. Overall, the study of passion as a socially embedded dynamic construct is currently missing a social network perspective.

To fill this gap, we investigate the co-evolution of entrepreneurial passion and peer networks. We use homophily theory and social contagion theory to hypothesize that entrepreneurs select similarly passionate others as network ties, and that once ties have been established, that passion exerts a social influence—or contagion—effect. To test these hypotheses, we use four waves of data collected from a cohort of 89 entrepreneurs (nested in 33 startup teams) who participated in a university-based accelerator program (e.g., Gielnik et al.,

[21] Prior studies have used aggregated mean and diversity scores (de Mol et al., 2020; Santos & Cardon, 2019); random coefficient modeling (repeated measure designs with lagged predictors; Lex et al., 2020); latent growth modeling (intraindividual differences in interindividual passion change over time; Collewaert et al., 2016); consensus emergence modeling (change in residual variance within groups; Uy et al., 2021). While offering some advantages (e.g., the ability to capture passion fluctuations over time), none of these methods adequately account for social network features and passion dynamics simultaneously.

2015; Kaandorp et al., 2020). Using this longitudinal panel data and Simulation Investigation for Empirical Network Analysis (SIENA) (Snijders, 2001), we find that entrepreneurs initially tend to initiate new ties with people who share a similar passion for founding new ventures. Once network ties have formed, high level of passion become infectious, especially within startup teams where peer ties are stronger and interactions more frequent. Surprisingly, the same effects do not appear when it comes to passion for inventing.

This study makes important contributions to entrepreneurial passion theory and to studies of entrepreneurial peer networks and research on startup teams. We contribute to research recognizing that entrepreneurial passion is an interindividual emotion affected by social forces (Murnieks et al., 2020). In particular, our framework and findings challenge prior work (e.g., Hubner et al., 2020; Uy et al., 2021) that has glossed over the selection mechanism linking entrepreneurial passion and social network ties and that has only considered one-way contagion effects (e.g., how entrepreneurs' network ties influence the emergence of entrepreneurial passion but not the other way around). In light of the present study, prior work may have substantially misrepresented how entrepreneurial peer networks and passion coevolve. In providing a more complete conceptualization and an empirical examination of this relationship, we enable deeper insights about passion as a socially embedded construct.

Additionally, our focus on peer entrepreneurs extends prior research on passion contagion beyond its current focus on investors (Davies et al., 2017; Murnieks et al., 2016), employees (Breugst et al., 2011; Hubner et al., 2020), or even the subset of peers that together form the co-founding team (Uy et al., 2021). Since we are able to capture the social processes that drive entrepreneurial passion among peers, both outside and within team boundaries, we respond to calls for a better understanding of "how a team member's entrepreneurial passion influences his

or her teammates' passion" (Patzelt et al., 2020: 11). Similarly, we draw on passion theory and advances in social network analysis to show how team formation is endogenous, demanding more attention to selection processes (Lazar et al., 2020).

Theory and Hypotheses

A Network Perspective on Entrepreneurial Passion

In this paper, we adopt Cardon et al.'s (2009) view of entrepreneurial passion as positive emotion for distinct entrepreneurial roles (see also Collewaert et al., 2016; Gielnik et al., 2015; Huyghe et al., 2016). More specifically, entrepreneurial passion is defined as "consciously accessible, intense positive feelings experienced by engagement in entrepreneurial activities associated with roles that are meaningful and salient to the self-identity of the entrepreneur" (Cardon et al., 2009: 517). Whereas several alternative views on passion in entrepreneurship have their own merit (e.g., Baum & Locke, 2004; Chen et al., 2009; Shane et al., 2003; Vallerand, 2008), Cardon et al.'s (2009) conceptualization offers distinct advantages relevant to our research question. Above all, it is rooted in role identity theory (e.g., Powell & Baker, 2014; 2017; Stryker & Burke, 2000), which acknowledges the centrality of social interactions. According to role identity theory, entrepreneurs inhabit one or more roles, including founder or inventor, and socially construct their understanding of (and identification with) such roles through interactions with others. These others confer the defining sets of behavioral norms and expectations onto that role (Stryker, 1980). Accelerator program are, almost by definition, highly social environments, and peer-to-peer interactions are often at the core of these programs (Cohen, Bingham et al., 2019; Hallen al., 2020). On top of this, going into accelerators, entrepreneurs are often differentially passionate toward entrepreneurial activities, which set the basic requirement for studying selection and contagion processes (de Mol et al., 2020).

While earlier studies position passion as the self-contained motivational source fueling the pursuit of entrepreneurial activity (Cardon et al., 2013), more recent studies resonate with Murnieks et al.'s (2020: 2) observation that entrepreneurial passion "as a construct that originates in a uniquely solitary and intraindividual manner within a person, may be obscuring important interindividual considerations." Consequently, these studies investigate passion's effect on those surrounding the entrepreneurs, including investors, employees, and startup team members. For instance, Davis et al. (2017) find that investor perception of founder passion increases positive affect and the likelihood that they will invest. Similarly, Hubner et al. (2020) show that contact with passionate entrepreneurs makes employees more passionate, boosting organizational commitment. Finally, and most relevant to our investigation, Uy et al. (2021) show that working closely with other entrepreneurs on the same startup team makes individuals converge in their affective experience of passion for founding over time. Beyond defining entrepreneurial passion in general terms, Cardon et al. (2009) propose three distinct domains of entrepreneurial activity to which feelings of passion might be directed: founding, inventing, and developing. Passion for founding relates to setting up a new venture, becoming an owner, and engaging with early-stage efforts to obtain necessary human, social, and financial capital. Passion for inventing relates to identifying and pursuing new opportunities, and enjoying the innovative problem-solving process associated with the creation of new products and services. Passion for developing relates to growing and expanding the venture after the initial founding stage, and central activities revolve around obtaining growth capital from external investors or improving internal management structures. We follow the established practice (e.g., Boone et al., 2020; Collewaert et al., 2016; Gielnik et al., 2015) of omitting passion for developing because our focus is on

nascent entrepreneurs in an early-stage accelerator program and passion for developing only becomes relevant at later stages.

In line with the idea that entrepreneurial passion involves an identity component as well as an affective one, each domain of entrepreneurial passion has two dimensions: identity centrality and intense positive feelings (Cardon et al., 2009; Cardon et al., 2013). Identity centrality denotes the consciously accessible, self-ascribed importance of "what it means to be an entrepreneur" (Murnieks et al., 2014: 1589) including its meaning in hierarchical distinction to other identities (Stryker & Serpe, 1994). Entrepreneurs differ in their sense of core identity (e.g., founder, developer, inventor) (Murnieks et al., 2020). Entrepreneurs for whom being a founder is central, for instance, are more likely to experience passion when engaging in activities related to this identity such as hiring new employees or securing venture capital (Cardon et al., 2009). Intense positive feelings are conscious changes in core affect experienced as "excitement, elation, and joy" (Cardon et al., 2009: 515) attributable to engagement in activities that are meaningful to an entrepreneur's identity (Baron, 2008; Chen et al., 2009).

Entrepreneurial Passion and Homophily Effects

Homophily is the tendency to associate with similar others (e.g., Ertug et al., 2022; Lawrence & Shah, 2020; McPherson et al., 2001). A considerable amount of research emphasizes the link between the observed homogeneity of entrepreneurial networks and homophily based not only on an array of shared attributes including gender, ethnicity, or education (e.g., Aldrich & Kim, 2007; Ruef et al., 2003; Vissa, 2011) but also on perceptions of the world around us (Parkinson et al., 2018). In this vein, investors are found to prefer entrepreneurs who share their thinking styles and professional backgrounds (Claes & Vissa, 2020; Franke et al., 2006; Murnieks et al., 2011). It is even possible for shared identities

stemming from similar traditions, experiences, or traumas, for example, to be used as a leverage to create interpersonal attraction (Phillips et al., 2013). Acknowledging this wide range of attributes consistent with the homophily mechanism, McPherson et al. (2001) build on Lazarsfeld and Merton (1954) to classify them into *status* attributes (e.g., demographics, education, occupation) and *value* attributes (e.g., values, attitudes, beliefs). McPherson et al. (2001: 419) suggest that *values* broadly include a "wide variety of internal states presumed to shape our orientation toward future behavior," and Lawrence and Shah (2020) specifically position cognitions and emotions within this category.

Although no study to date has identified shared entrepreneurial passion as an attribute that amplifies associations between entrepreneurs, the passion literature consistently conceptualizes entrepreneurial passion as "identity-focused affect" (Cardon, Post et al., 2017: 286), while emotional theory positions affect as an attribute individuals use to assess their sense of similarity to others (Barsade & Gibson, 1998). Central to these arguments is the claim that passion is readily observable and thus can be used as a criterion for selection. This is the case for intense positive feelings because "the experience of passion will lead entrepreneurs to display their situational emotions more frequently and intensely" (Cardon, 2008: 79), as well as for identity centrality. For instance, Hubner et al., (2020) show that potential employees can pick up on entrepreneur's identity displays in video pitches where entrepreneurs talk about how activities related to inventing, founding, or developing are important and meaningful to them. Therefore, in line with Lawrence and Shah's (2020) categorization of "emotions" and "cognitions" that inform and spur the formation of social ties, we suggest that homophilous ties between peer entrepreneurs can form on the basis of intense positive feelings and identity centrality—the key affective and cognitive dimensions of entrepreneurial passion (Cardon et al., 2009).

A review of the homophily literature suggests that associations between two individuals can be the result of (1) opportunity (i.e., availability of similar others) and (2) individual preference (i.e., given the choice, individuals prefer similar others). Yet, ties may also arise because (3) a shared understanding develops about what sharing a specific attribute in a given social context implies, which then influences individual preferences (i.e., socially constructed homophily). For example, when two entrepreneurs mutually regard being a "founder" or "inventor" as central to their self-identities, the propensity that they will meet is higher, because that role identification leads them to privilege activities and social environments consistent with that role (e.g., investor pitch training for founders) (Burke & Reitzes, 1991; Goffman, 1959). When entrepreneurs engage in role-consistent activities, joy and enthusiasm are evoked and broadcasted publicly through facial expressions and body language (Cardon, 2008; Hubner et al., 2020). This increases entrepreneurs' capacity to attract similar others, because positive experiences of emotions escape conscious emotion regulation more readily and can therefore be observed and used as a basis for selection (Gross, 1999). Moreover, entrepreneurs do not consider relationships with others in a vacuum; they base choices for affiliation on a shared sense of identity (Murnieks et al., 2014; Murnieks et al., 2020). Therefore, those that share a similar notion of centrality for a specific entrepreneurial role identity are more likely to associate with similar others and form networks more readily (Greenberg & Mollick, 2017; Lawrence & Shah, 2020). Taken together, we expect entrepreneurs to form ties with others who have similar levels of passion for founding. We expect the same for passion for inventing. Thus:

Hypothesis 1a: Similarity in passion for founding has a positive effect on network tie formation among entrepreneurs.

Hypothesis 1b: Similarity in passion for inventing has a positive effect on network tie formation among entrepreneurs.

Entrepreneurial Passion and Social Contagion Effects

Despite the theoretical rationale for expecting peer entrepreneurs to exhibit similar levels of entrepreneurial passion, given the homophilic potential, an alternative explanation would suggest that a shared sense of passion may be driven by a process of social influence. Social influence—otherwise referred to as "contagion"—describes the mechanism by which "a person or group influences the emotions or behavior of another person or group through the conscious or unconscious induction of emotional states and behavioral attitudes" (Schoenewolf, 1990: 50). For the contagion of emotions such as passion, both affective transfer as well as identity internalization processes are essential psychological mechanisms (for a review: Ashforth & Schinoff, 2016; Douglas et al., 2008).

On the one hand, social contact and emotional cues such as non-verbal facial expressions and body movements (Barsade, 2002; Buck et al. 1992) are conduits for affective transfer mechanisms such as emotional mimicry (Hatfield et al., 1994; Hess & Fischer, 2013). For instance, with regards to entrepreneurial passion, Cardon (2008) proposes that employees may adopt passionate behaviors and expressions because they subconsciously mimic and then internalize passion displayed by others (also: Lazarus, 1991; Neumann & Strack, 2000). On the other hand, individuals might also consciously come to an understanding as to why others engage in certain behaviors after picking up, and reflecting upon, communications related to the meaning associated with an identity (Douglas et al., 2008; Hillebrandt & Barclay, 2017; Hubner et al., 2020). This cognitively elaborate process leads to internalization of identity displays because observers begin to view themselves through the eyes of others and understand the collective values and meanings behind certain entrepreneurial activities (Ashforth & Kreiner, 1999). In turn, this understanding can motivate engagement in similar behavior and thereby

facilitate the emergence of similar emotions (Bagozzi & Lee, 2002; Sullins, 1991; Vallerand et al., 2014).

Although social contagion can have different sources, including supervisors and CEOs (Ho & Astakhova, 2020; Sy et al., 2005), mentors (Becker et al., 2019; Eesley & Wang, 2017), and entrepreneurial parents (Bosma et al., 2012), one type of social relationship—peers—has gained particular attention in entrepreneurship research (e.g., Ebbers & Wijnberg, 2019; Nanda & Sørensen, 2010; Kacperczyk, 2013). For instance, Nanda and Sørensen (2010) find that proximity to workplace peers with a background in entrepreneurship is associated with an increased likelihood of a person becoming an entrepreneur. Likewise, Ebbers and Wijnberg (2019) show that peers at school develop similar future entrepreneurial aspirations through social network ties and contact with peers. More recently, Uy et al. (2021) show that working closely with other entrepreneurs on the same startup team makes individuals converge in their affective experience of passion for founding over time.

On this basis, we propose that in situations where peer entrepreneurs are positioned to recognize social cues, whenever a focal entrepreneur expresses their passion, whether through speech, facial expressions and body movements (e.g., an inventor passionately tinkering on a technical product solution) or via identity displays (e.g., a founder at a pitch event broadcasting the meaning he or she derives from engaging in the entrepreneurial pursuit), a passion response may be evoked such that a similar magnitude of passion is internalized by the recipient (Barsade, 2002; Hatfield et al., 1994; Sullins, 1991; Vallerand, et al., 2014). Thus:

Hypothesis 2a: There is a social contagion effect of passion for founding among peer entrepreneurs.

Hypothesis 2b: There is a social contagion effect of passion for inventing among peer entrepreneurs.

Thus far, we have positioned social interactions among peer entrepreneurs as a conduit to the transfer of entrepreneurial passion. This rationale can be extended to suggest that social contagion should be particularly strong when it comes to entrepreneurs on the same startup team. Because startup team members work together, social network ties within the cofounding team tend to be both deeper and more frequent compared to ties with other peers. The claim that social contagion between any two individuals increases with more interaction has received wide empirical support (e.g., Festinger et al., 1950; Kacperczyk, 2013; Lomi et al 2011). For example, friends, in contrast to mere classmates at school, seem to be disproportionately influential with regards to career choices because they spend much time interacting with each other (Lomi et al., 2011). And, most convincingly, Kacperczyk (2013) shows that while university peers play a substantial role by influencing entrepreneurial entry in general, peers that are geographically and socially closer exert a greater influence. We therefore hypothesize that:

Hypothesis 3a: Social contagion effects of passion for founding are stronger for ties within the startup team than for peer ties outside the startup team.

Hypothesis 3b: Social contagion effects of passion for inventing are stronger for ties within the startup team than for peer ties outside the startup team.

Methods and Data

Empirical Setting

Our empirical setting is a university-based startup accelerator program that closely mimics traditional/private accelerators with an intensive time-bound program, where teams of student entrepreneurs receive education and support to start and/or advance their new ventures (Kaandorp et al., 2020; Souitaris et al., 2007). Over the course of five months, our sample experienced heavy workloads spread across practical workshops, lectures, mentor sessions, and, above all, their ongoing engagement with founding and running a new venture (e.g., Boss et al.,

2021; Lyons & Zhang, 2018). Program alumni created expense management software, social networking platforms for coworking spaces, and IT solutions for property owners to manage tenants, for example. While some ventures do dissolve at the end of the program (as typical in other accelerators; e.g., Yu, 2020), it is not rare for alumni startups to demonstrate strong growth following the program, with some teams securing external investments to further scale their operations, and several reaching an exit (e.g., via acquisition).

While we acknowledge the potential caveats associated with studying student entrepreneurs more generally, there are several reasons why we deem this sample appropriate to our research question. First, participants in our study represent the population of interest, as they do indeed create and run real businesses within an accelerator setting, including key entrepreneurial activities like legal registration, product development and testing, and selling (e.g., Arenius et al., 2017; Reynolds, 2017; Reynolds & Miller, 1992). The notion that entrepreneurial passion is evoked through meaningful "engagement in entrepreneurial activities" (Cardon et al., 2009: 525)is also consistent with the specific theory we speak to. Second, the specific phenomena we study in terms of homophily selection and social contagion are grounded in broad theory about social interaction (D. K. Hsu et al., 2017; Stevens, 2011) and as such should apply in our specific empirical context too. Finally, it is not surprising that similar samples are extensively used in empirical studies on entrepreneurial passion (e.g., Gielnik et al. 2017; Lex et al. 2020).

Method

We use the Simulation Investigation for Empirical Network Analysis (SIENA) as our main analytical framework.[22] SIENA, is an actor-oriented statistical model for studying the co-evolution of networks and individual actor characteristics (Steglich et al. 2006). SIENA uses panel data to specifically separate endogenous structural network effects from exogenous actor level effects[23] thereby allowing researchers to statistically separate often highly correlated effects of network structure, selection, and social contagion. While data are recorded at discrete points in time (i.e., panel data), the model assumes continuous change in network ties and entrepreneurial passion between waves. Statistically, continuous change between discrete panel waves is modelled as a stochastic process utilizing a Markov chain (Snijders et al., 2007). This means that observed changes in peer networks and entrepreneurial passion are broken down into mini-steps (i.e., sequences of many small changes). The exact ordering of mini-steps is varied using simulations and used for hypothesis testing. During each of these mini-steps, an entrepreneur is presumed to decide whether to form or dissolve a tie to another entrepreneur or to adjust his or her entrepreneurial passion. In the next mini-step, the future network and passion state is predicted solely as a function of the current network and passion state without "memory" of the entire historical sequence of events from which the current state has evolved (Snijders et al., 2010; Steglich et al., 2010).

[22] We used the software package RSIENA 1.2-23. For a detailed mathematical treatment of SIENA, we refer the reader to Snijders et al. (2007). For a tutorial introduction to SIENA, we refer the reader to Steglich et al. (2006). Finally, for a hands-on explanation about how to use SIENA, including an overview of all its different effects and how to interpret them, we refer the reader to Appendix C as well as the latest version of the RSIENA user's manual (Ripley et al., 2022) available for download from the SIENA website.

[23] Covariates or actor level effects are exogenous in the sense that their values are not modeled but used to explain network or behavior change. Passion change in the behavior part of the model is endogenous. We thank an anonymous reviewer for helping us clarifying this point.

SIENA models mini-steps by specifying and maximizing two separate multinominal logistic functions called evaluation functions for network tie change and actor behavior change (i.e., passion), respectively (Snijders, 2001). Evaluation functions are the primary determinant for the probability of change at each mini-step and incorporate effects that are specified by the researchers (i.e., independent variables); effects are to be interpreted as contributions to log probabilities of increasing network ties, or changing behavior (Ripley et al., 2022). Finally, to capture the co-evolution of networks and behavior, SIENA consolidates both evaluation functions, thereby mutually controlling one for the other (Steglich et al., 2010).

Sample and Data Collection

In total, we collected four waves of social network and individual actor level data. Unlike other studies (Collewaert et al., 2016; Lex et al., 2020; Uy et al., 2021), we were able to use the particular setup of the accelerator program to collect the first wave of data *after* individual participants signed up but *before* the program officially started. In this first wave, we established constant actor attributes (e.g., age, sex, education, previous founding experience), changing actor attributes (i.e., entrepreneurial passion), and existing social network ties to other participants as a baseline. At the onset of the program, all participants received rudimentary guidance about team formation suggesting that they maintain diversity in terms of gender, study background, work experience, and country of origin; aim for 3-4 people per team, and promote psychological safety (e.g., Edmondson, 1999). We confirmed that entrepreneurial passion was not part of these team formation instructions.

In total, the entrepreneurs formed 33 startups, out of which five were founded by solo entrepreneurs ($M_{startup}$ = 2.94; SD = 1.06). Following our baseline measure and team formation, we surveyed the entrepreneurs during weeks 6, 12, and 18 of the program, which we labelled

"start," "midpoint," and "end," respectively. These three waves captured the entrepreneurs' and their startup teams' feedback immediately after team formation, during the program, and in the week leading up to Demo day—all critical junctures in the accelerator program and participants' entrepreneurial development. The second through fourth wave were identical to the baseline except that we dropped constant actor attributes because these (e.g., birth year) do not change over time (see Appendix C: Table 16 for an overview of measures across waves).

SIENA relies on high response rates to estimate network evolution in a stable manner. As a rule of thumb, an 80% response rate should be considered the bare minimum, to avoid any assumptions that the missing data are absent by chance (Huisman & Steglich, 2008; Ripley et al., 2022; Sparrowe et al., 2001). Therefore, to further incentivize participation, we conducted lotteries for participants to win vouchers totaling €500 for a familiar online shop during each wave of measurements. All waves exceeded acceptable response rate thresholds and ranged from 83% (end) to 97% (midpoint).

At baseline, the cohort consisted of 102 individual participants. Following recommendations for longitudinal designs (Ployhart & Vandenberg, 2010), our final sample comprised all participants who took part in at least two measurement waves. We removed ten participants—six of which were program dropouts—that had not responded to more than two waves. Three additional participants could not be selected as social network ties by other entrepreneurs in the program because they were absent from participation records (i.e., records provided by program management that were used to build the name generator in our survey). In total, we excluded those 13 cases from all four waves of data. To test for non-response bias, we compared these 13 cases with the final sample of 89 respondents. There were no significant differences between respondents and non-respondents for all measures at baseline.

Measures

Social Networks

We generated social networks by asking "With which students in the [entrepreneurship program name] do you spend your free time with?" to mitigate the risk involved in mixing the given structure of the accelerator program with the voluntary choice of actors. We followed an interactionist approach, instructing participants to select cohort members they interacted with across informal social activities such as coffee or cigarette breaks (Kleinbaum et al., 2015). Independent of the startup team, participants could select up to ten cohort members. This is in line with other social network studies that tend to use a maximum of 10 names to avoid respondent fatigue (Brace, 2018). After each wave w we generated social network matrices of size $N = 89$. In each matrix, the cell x_{ijw} is equal to 1 if the row participant i reported a tie to the column participant j at that wave w, otherwise $x_{ijw} = 0$. Consequently, we created social networks based on 31,328 non-independent observations from 7,832 pairs of actors (89×88) across four waves.

Entrepreneurial Passion

We measured passion at the level of the individual entrepreneur (rather than the team) using Cardon et al.'s validated scales (Cardon et al., 2013) as we were interested in modeling actor-driven networks where individual entrepreneurs select, maintain, or remove ties to other entrepreneurs between waves (Snijders et al., 2010). We accounted for two domains of entrepreneurial passion: passion for founding and passion for inventing. Within the domains of founding and inventing, there are two dimensions: intense positive feelings towards a founding or inventing activity and identity centrality, which refers to the importance of the activity to the person's identity (Murnieks et al., 2014).

Passion for founding was measured using three items, each capturing the experience of intense positive feelings associated with founding, and an additional single-item measure for the centrality of the founder role. Sample items include "Establishing a new company excites me," (i.e., intensive positive feelings), and "Being the founder of a business is an important part of who I am" (i.e., identity centrality). All items were keyed on a 1–5 Likert scale. Passion for founding demonstrated satisfactory reliability ranging from 0.68 to 0.83 across the four waves.

Passion for inventing was measured with four items capturing the experience of intensive positive feelings for inventing and an additional single-item measure for the identity centrality of the inventor role. Sample items include: "Searching for new ideas for products/services to offer is enjoyable to me," (i.e., intensive positive feelings), and "Inventing new solutions to problems is an important part of who I am" (i.e., identity centrality). All items were keyed on a 1–5 Likert scale. Passion for inventing demonstrated satisfactory reliability ranging from 0.77 to 0.88 across the four waves.

Finally, in line with Cardon et al.'s (2013) recommendation, we considered passion to be the composite of those two components and obtained passion scores by averaging the experience of intensive positive feelings and multiplying this by the single identity centrality item (e.g., Cardon & Kirk, 2015). To fit the SIENA model, which relies on categorical variables to model changes in attitudes and allows only for a limited number of categories (Ripley et al., 2022), we transformed the passion scores to fit five categories. All scale transformations can be found in Appendix C (see Table 16).

Startup Team Membership

To account for differential opportunities for social network tie formation, we drew on records provided by the accelerator program manager and slides used by startup teams during

their Demo day pitches to create same startup team as a control variable. As members might enter and leave teams with implications for team characteristics and processes (Knight, et al., 2019), we captured team membership with a changing dyadic covariate w_{ij} (Ripley et al., 2022). w_{ij} is the dyadic tie variable between actors *i* and *j* which equals 1 if they are on the same team and 0 otherwise.

Controls

Control variables were measured at baseline and included entrepreneurs' *age*, *sex,* *education*, and *entrepreneurial experience*. Four entrepreneurs included in the final sample did not respond to the baseline. These missing data were imputed using median scores[24] (i.e., age: 21; no entrepreneurial experience) or complemented from additional information such as profile pictures used in Demo day presentations (i.e., sex) and supplementary records provided by the program director (i.e., education).

Results

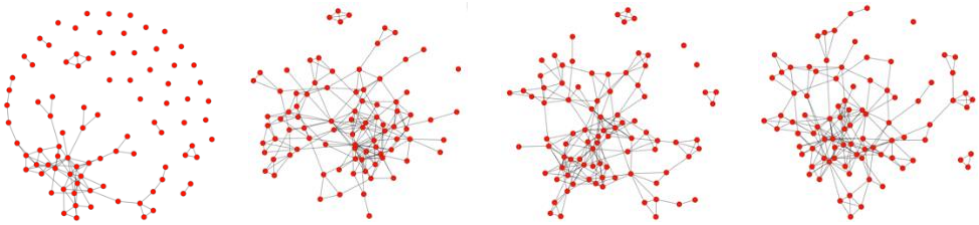
Descriptives

Table 8 summarizes the key descriptive statistics of the network data. First, we measured network density by dividing the number of realized ties by the total number of potential ties at the level of the cohort. The total number of ties increased from 130 (i.e., Wave 1) to 339 ties (i.e., Wave 4) over time. Fewer entrepreneurs participated in Wave 4 which explains the lower absolute number of ties in that wave as compared to Wave 3. Second, SIENA requires a certain range of network stability between waves. The Jaccard index is used to gauge the stability of the network between successive waves and can range from 0 to 1. Higher scores indicate greater stability (and less change in the network configuration from one wave to the next), whereas

[24] To ensure imputation did not alter our results, we performed a robustness test without imputation (see Appendix C). Robustness results are identical with findings reported in Table 3.

lower scores indicate less stability (and more network change going from one wave to the next). Generally, Jaccard values of .3 and higher are considered good whereas values lower than .2 might pose estimation difficulties (Snijders et al., 2010). In our data, the Jaccard index between each wave is 0.26, 0.53, and 0.66, respectively. Hence, there is more network change comparing Wave 1 and Wave 2 than Wave 2 and Wave 3 and so on (see visualizations provided in the lower panel of Table 8). Taken together, these descriptive statistics show that participants—many of whom were strangers initially—formed new ties throughout the program but particularly in the period between Wave 1 and Wave 2 when the number of ties jumped from 130 to 297.

Table 8: Descriptive network statistics SIENA ($N = 7832 \times T = 4$ waves)

	Wave 1	**Wave 2**	**Wave 3**	**Wave 4**
Network				
Total number of ties	130	297	339	299
Density	0.017	0.043	0.045	0.046
Avg. number of outgoing ties	1.529	3.759	3.942	4.041
Min. number of outgoing ties	0	0	0	1
Max. number of outgoing ties	9	10	10	10
Jaccard index	-	0.257	0.532	0.657
Startup teams				
Number of teams	-	28	29	29
Avg. team size	-	3.29	3.15	3.21
Number of solo founders	-	5	4	4
Network visualization				

Note: n = 89. Density = total number of ties / Nodes ´ (Nodes - 1). Network visualization graphs were created using the Fruchterman-Reingold algorithm in *R v4.0.3* (R Core Team, 2020) utilizing the *igraph v1.2.6* (Csárdi & Nepusz, 2006). Entrepreneurs are represented by red circles; lines indicate a network tie.

Table 9 summarizes the means, standard variations, and correlations. Four patterns emerge as relevant to our analytical approach. First, there is a positive correlation between previous founding experience and passion for founding in Wave 1, Wave 2, and Wave 3. A more detailed analysis revealed significant correlations ranging from $r = .22$ to $r = .28$ between founding experience and identity centrality of passion for founding across all four waves (all p's $< .05$) indicating that the identity of being a founder is a more central self-concept to entrepreneurs who have established businesses before (Murnieks et al., 2014). There are significant correlations ranging from $r = .51$ to $r = .71$ between the passion domains of inventing and founding for each wave of data collection. These observations suggest that passion domains share a moderate amount of variance (e.g., .512 = 26%) but remain distinct constructs (Cardon et al., 2013). We further established significant correlations within domains over time in the range of $r = .54$ to $r = .75$ suggesting that passion levels are somewhat enduring (Cardon et al., 2013). Correlations of this magnitude are consistent with prior longitudinal research (e.g., Cardon et al., 2013; Collewaert et al., 2016; Lex et al., 2020) and suggest that passion is sufficiently dynamic to model contagion effects (Uy et al., 2021). Finally, the mean passion levels (both founding and inventing) diminished slightly, while passion variances increased. This interesting observation reflects research on accelerator programs and entrepreneurship education more generally, which suggests that entrepreneurs in those programs either quickly discover what they enjoy or accelerate their realization of what they do not enjoy (Shankar & Clausen, 2020).

Table 9: Descriptive statistics including means, standard deviations, and correlations

	Attribute	Wave	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
	Controls															
1	Age	W1	20.99	1.15												
2	Sex[a]	W1	0.74	0.44	0.017											
3	Education[b]	W1	0.72	0.45	0.081	-0.083										
4	Experience[c]	W1	0.21	0.41	0.053	-0.068	0.082									
	Passion for															
5	Founding	W1	3.74	0.97	0.050	0.065	0.084	0.233*	(0.679)							
6	Inventing	W1	4.08	0.82	0.050	0.126	-0.101	0.084	0.449**	(0.769)						
7	Founding	W2	3.87	0.94	0.110	0.019	-0.031	0.235*	0.661**	0.425**	(0.836)					
8	Inventing	W2	3.95	0.93	0.140	0.001	-0.096	0.160	0.332**	0.526**	0.608**	(.803)				
9	Founding	W3	3.73	1.11	0.015	-0.051	-0.174	0.280**	0.492**	0.338**	0.647**	0.479**	(.769)			
10	Inventing	W3	3.94	0.87	-0.122	0.081	-0.101	0.166	0.377**	0.468**	0.507**	0.647**	0.615**	(.792)		
11	Founding	W4	3.54	1.13	0.108	0.075	0.025	0.196	0.594**	0.394**	0.692**	0.510**	0.684**	0.622**	(.825)	
12	Inventing	W4	3.81	0.92	0.031	0.166	-0.036	0.136	0.333**	0.551**	0.428**	0.554**	0.435**	0.665**	0.655**	(.800)

Note: n ranging between 73 and 89. [a] women = 0, men = 1; [b] no business education = 0, business education =1; [c] no founding experience = 0, previous founding experience = 1.
Internal consistency: Cronbach Alpha (diagonal).
* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table 10: Results SIENA analyses

Variable	Passion for Founding			Passion for Inventing		
	Model 1: Cohort	Model 2: Team	Model 3: Extra-team	Model 4: Cohort	Model 5: Team	Model 6: Extra-team
Network as outcome	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Rate t1-t2	19.341** (5.309)	18.787** (4.827)	19.028** (5.298)	18.762** (3.612)	18.880** (4.836)	18.789** (3.873)
Rate t2-t3	6.298** (0.763)	6.303** (0.836)	6.284** (0.783)	6.221** (0.791	6.223** (0.816)	6.233** (0.784)
Rate t3-t4	3.888** (0.511)	3.885** (0.516)	3.892** (0.522)	3.927** (0.539)	3.923** (0.541)	3.915** (0.554)
Outdegree	-3.299** (0.256)	-3.292** (0.252)	-3.294** (0.263)	-3.304** (0.246)	-3.291** (0.253)	-3.295** (0.245)
Reciprocity (R)	2.490** (0.278)	2.510** (0.296)	2.511** (0.295)	2.498** (0.296)	2.518** (0.304)	2.523** (0.289)
Transitivity (T)	1.866** (0.143)	1.873** (0.143)	1.869** (0.152)	1.876** (0.142)	1.880** (0.150)	1.881** (0.135)
R×T	-0.380 (0.366)	-0.374 (0.370)	-0.387 (0.407)	-0.376 (0.374)	-0.417 (0.389)	-0.409 (0.370)
Indegree alter	-0.027 (0.037)	-0.029 (0.036)	-0.028 (0.038)	-0.016 (0.034)	-0.017 (0.035)	-0.018 (0.036)
Outdegree alter	-0.183** (0.044)	-0.185** (0.042)	-0.185** (0.044)	-0.197** (0.042)	-0.194** (0.042)	-0.197** (0.045)
Outdegree ego	0.036* (0.013)	0.036* (0.013)	0.036* (0.013)	0.036* (0.014)	0.036* (0.014)	0.037* (0.013)
Same team	2.273** (0.183)	2.281** (0.182)	2.280** (0.186)	2.292** (0.171)	2.280** (0.171)	2.286** (0.166)
Entrepreneurial passion						
Alter	-0.034 (0.070)	-0.032 (0.076)	-0.036 (0.078)	-0.081 (0.100)	-0.080 (0.102)	-0.076 (0.102)
Alter^2	0.119 (0.064)	0.124 (0.068)	0.118 (0.066)	0.001 (0.095)	0.003 (0.096)	-0.010 (0.093)
Ego	0.078 (0.085)	0.077 (0.086)	0.068 (0.088)	0.089 (0.112)	0.088 (0.112)	0.084 (0.107)
Ego^2	-0.008 (0.082)	-0.009 (0.090)	-0.004 (0.095)	0.082 (0.104)	0.080 (0.102)	0.084 (0.099)
H1 (Ego – Alter)^2	-0.071* (0.034)	-0.072* (0.035)	-0.071* (0.034)	-0.062 (0.051)	-0.061 (0.049)	-0.064 (0.050)
Controls:						
Age						
Alter	0.074 (0.047)	0.074 (0.050)	0.076 (0.049)	0.079 (0.049)	0.082 (0.050)	0.078 (0.049)
Alter^2	0.046 (0.027)	0.047 (0.026)	0.045 (0.027)	0.041 (0.027)	0.040 (0.027)	0.042 (0.028)
Ego	0.047 (0.059)	0.050 (0.059)	0.046 (0.058)	0.052 (0.057)	0.052 (0.059)	0.053 (0.059)

(Table continued next page)

Table 10: (continued)

Controls:	Model 1:	Model 2:	Model 3:	Model 4:	Model 5:	Model 6:
Age						
Ego^2	0.0255 (0.029)	0.025 (0.029)	0.027 (0.027)	0.027 (0.028)	0.026 (0.028)	0.025 (0.029)
(Ego – Alter)^2	-0.0243 (0.016)	-0.025 (0.016)	-0.025 (0.016)	-0.025 (0.016)	-0.025 (0.016)	-0.025 (0.016)
Sex (men = 1)						
Alter	-0.218* (0.104)	-0.220* (0.107)	-0.216* (0.105)	-0.210* (0.102)	-0.207* (0.104)	-0.205* (0.104)
Ego	-0.126 (0.125)	-0.126 (0.124)	-0.124 (0.127)	-0.130 (0.124)	-0.134 (0.127)	-0.133 (0.129)
Same	0.323** (0.095)	0.325** (0.097)	0.327** (0.099)	0.326** (0.097)	0.324** (0.104)	0.326** (0.099)
Education (business = 1)						
Alter	0.080 (0.119)	0.080 (0.122)	0.083 (0.120)	0.083 (0.119)	0.087 (0.119)	0.091 (0.118)
Ego	-0.273 (0.150)	-0.271 (0.149)	-0.273 (0.147)	-0.259 (0.148)	-0.264 (0.153)	-0.272 (0.149)
Same	0.395** (0.108)	0.393** (0.110)	0.395** (0.111)	0.396** (0.111)	0.387** (0.110)	0.390** (0.109)
Entrepreneurial experience (yes = 1)						
Alter	0.055 (0.127)	0.058 (0.128)	0.053 (0.129)	0.039 (0.120)	0.038 (0.122)	0.035 (0.125)
Ego	0.018 (0.142)	0.013 (0.146)	0.021 (0.142)	0.066 (0.136)	0.061 (0.142)	0.056 (0.1135)
Same	-0.203 (0.117)	-0.205 (0.118)	-0.209 (0.116)	-0.185 (0.117)	-0.188 (0.116)	-0.191 (0.122)
Passion as outcome						
Rate t1-t2	1.427** (0.327)	1.477** (0.327)	1.503** (0.365)	1.962** (0.486)	1.922** (0.511)	1.947** (0.491)
Rate t2-t3	1.468** (0.340)	1.442** (0.314)	1.438** (0.330)	1.089** (0.254)	1.080** (0.244)	1.069** (0.244)
Rate t3-t4	1.359** (0.295)	1.379** (0.302)	1.343** (0.299)	1.149** (0.247)	1.157** (0.273)	1.149** (0.253)
Linear shape	0.165 (0.098)	0.152 (0.094)	0.156 (0.090)	0.098 (0.104)	0.086 (0.102)	0.075 (0.106)
Quadratic shape	-0.133 (0.082)	-0.100 (0.067)	-0.039 (0.058)	-0.203* (0.082)	-0.219* (0.084)	-0.215* (0.082)
Contagion of passion						
H2 Avg. alter	0.724* (0.299)			0.191 (0.302)		
H3 Avg. alter × team		0.436* (0.165)			0.303 (0.208)	
H3 Avg. alter × extra-team			0.084 (0.245)			-0.573 (0.460)

Note: All analyses were run with unconditional estimation, centered covariates (except for *team* which was used in interaction) and 5000 iterations to rule out chance findings. Reported coefficients are non-standardized. Standard errors reported in parentheses. As *age* is continuous, we employed a squared difference effect. All models fulfilled standard convergence thresholds: all convergence *t*-ratios < 0.07; all overall maximum convergence ratios < 0.25 (Ripley et al., 2022).

* $p < 0.05$

** $p < 0.01$

Simulation-Based Results

Table 10 reports the results for passion for founding (Model 1–3) and passion for inventing (Model 4–6) obtained from the SIENA analyses. Insofar as the results are similar, we take passion for founding (Model 1) as an example to describe how results should be interpreted. Although SIENA as a method has recently made inroads into entrepreneurship research (Ebbers & Wijnberg, 2019), it is still a relatively new tool for scholars in our field. Therefore, in addition to the model and the findings obtained from it that we report in the text below, we also present an extensive overview of all effects—including their mathematical representation, general interpretation, as well as their (non-technical) interpretation based on our specific study—in Appendix C.

Structural Network Effects

The *rate* parameter for the network as an outcome variable indicates the frequency with which entrepreneurs change their ties to other entrepreneurs. The large coefficient representing the network change from Wave 1 to Wave 2 is explained by most entrepreneurs being mutual strangers before the start of the program. To control for actor position and embeddedness in the network, we included *outdegree*, *reciprocity*, *transitivity*, as well as *degree-related* and *team* effects, which can be understood as basic structural effects that can affect the subsequent formation of network ties (Snijders et al., 2010; Snijders & Lomi, 2019).

The *outdegree* parameter is the intercept for the sub-models predicting network ties and measures how likely entrepreneurs are to send ties to each of their cohort peers. A negative outdegree parameter (e.g., Model 1: -3.299, $p < .01$) shows that the average entrepreneur is tied to less than half of the cohort and indicates that network densities are low (Ripley et al., 2022).

Reciprocity was significant across all models (e.g., Model 1: 2.490, $p < .01$) indicating a general tendency to reciprocate incoming ties (i.e., entrepreneur *i* is more likely to nominate[25] entrepreneur *j* as a tie when entrepreneur *j* nominates entrepreneur *i* as a tie, and vice versa).

Transitivity, the tendency to "befriend the friends of one's friends," is measured by the *geometrically weighted edgewise shared partners* (GWESP) effect (Davis, 1970; Ripley et al., 2022). We observed a significant transitivity effect (e.g., Model 1: 1.866, $p < .01$), indicating a tendency for network closure, which means entrepreneurs form and maintain ties with their alters' alters. We also included the interaction of *transitivity* and *reciprocity* effects (R×T) to control for their tendency to offset one another (Block, 2015).

Next, we included degree-related network effects including *indegree alter* (i.e., tendency to attach to popular actors), *outdegree alter* (i.e., tendency to be tied to actors that have many outgoing ties), and *outdegree ego*[26] effects (i.e., tendency of actors with many outgoing ties to continue sending out new ties), which represent basic properties of network dynamics and should be included to avoid confounding theoretically relevant covariate effects with general processes of network formation (Ripley et al., 2022). We did not find a significant indegree alter effect. Outdegree alter was significant and negative (e.g., Model 1: -0.183, $p < .01$) while outdegree ego was significant and positive (e.g., Model 1: 0.036, $p < .05$) indicating that entrepreneurs with high outdegrees are less popular as social network ties in general yet express a tendency to nominate many more entrepreneurs as ties. Finally, we included the changing dyadic covariate *same startup team* to control for the tendency of

[25] Following the standard approach used by the SIENA research community, we use the word *nominate* throughout the paper to express that entrepreneur *i* states a tie exist to entrepreneur *j*—independent of what entrepreneur *j* states. Such a tie is bidirectional only if entrepreneur *j* also nominates entrepreneur *i* as a network tie; It is unidirectional otherwise.

[26] In many applications of social network analysis, including SIENA, "ego" and "alter" effects are also referred to as "activity" or "sender" and "popularity" or "receiver" effects respectively. To use consistent terminology, we will go on referring exclusively to ego and alter effects.

entrepreneurs to establish ties with entrepreneurs on the same team more readily. This effect was positive and significant (e.g., Model 1: 2.273, $p < .01$).

Entrepreneurial Passion and Actor-level Controls

Next, with respect to covariate effects for entrepreneurial passion as well as our controls for age, sex, education, and entrepreneurial experience, we specified *alter* (i.e., the degree to which covariate affects the number of incoming ties) and *ego* (i.e., the degree to which covariate affects the number of outgoing ties) effects. To test for homophily, *same* or *difference squared effects* were specified depending on whether the actor attribute is dichotomous (i.e., sex, education, entrepreneurial experience) or categorical/continuous (i.e., entrepreneurial passion, age).

Whereas the *same* effect expresses homophily in terms of absolute difference between attribute value of ego and alter alone, the *difference squared* effect draws on a parametric set of functions including alt^2 and ego^2 to control for non-linearities (Schaefer & Kraeger, 2020; Snijders & Lomi, 2019). For instance, passion homophily may be confounded with other mechanisms including aspiration (i.e., attraction to high values of passion), attachment conformity (i.e., attraction to a passion value common or normative for actors in the network), and sociability (i.e., the inclination of high passion entrepreneurs to make many tie choices).[27] Only a parametric set of functions can model these mechanisms accordingly because the location of the optimum can be close to ego's value to represent homophily, can be drawn toward a common (normative) value to represent attachment conformity, and can be higher or lower to represent aspiration (Snijders & Lomi, 2019). Significant *same* or *difference squared parameters* indicate that the smaller the difference between the covariates of ego and alter, the more likely there is a tie between two actors.

[27] For a detailed mathematical derivation as well as shortcomings of a linear modeling approach for homophily in terms of absolute difference between ego's and alter's passion, we refer to Snijders and Lomi (2019). For a more in-depth interpretation of our modeled effects, we also refer readers to Appendix C (see Table 17).

Entrepreneurial Passion.

In partial support of Hypothesis 1, we found a significant homophily effect for passion for founding (Hypothesis 1a; Model 1: -0.071; $\chi^2(1) = 5.20$; $p = .023$) but not inventing (Hypothesis 1b; Model 4: -0.062, $\chi^2(1) = 1.65$; $p = .199$). Our results with regards to passion for founding can be interpreted as follows: All else being equal, the probability that we will observe an entrepreneur *i* with high passion for founding (e.g., $z_i = 5$) connecting with entrepreneur *j* with high passion for founding (e.g., $z_j = 5$) is 3.11 times larger than the probability of entrepreneur *i* forming a tie with another entrepreneur *h* with low passion for founding (e.g., $z_h = 1$).[28]

Constant Actor Attributes (Controls).

Again, we test *alter*, *ego*, and *same* effects for all control variables except age for which we specified ego^2, alt^2, and *difference squared* effects. We found significant same sex (e.g., Model 1: 0.323, $p < .01$) and same education (e.g., Model 1: 0.395, $p < .01$) effects reflecting the tendencies of entrepreneurs to prefer ties with others of the same sex and educational background. In addition, we established an alter effect of sex (e.g., Model 1: -0.218, $p < .05$), indicating that entrepreneurs nominate females as ties more often—which is likely a remnant of team formation instructions within the program advocating for team gender diversity.

Passion Contagion

The bottom half of Table 10 reports the results for the behavior as outcome models that we label "passion as outcome." Again, we distinguished between passion for founding (Model 1–3) and passion for inventing (Model 4–6) and refer to Appendix C for a comprehensive interpretation of all effects (see Table 17). The *rate parameter* indicates

[28] Assuming *j* and *h* are equivalent in all other respects, the probability that *i* will connect to *j* instead of *h* in the next mini-step is calculated via the diffSqX effect in SIENA: $exp(-0.071 \times ((z_i - z_j)^2 - (z_i - z_h)^2)) = exp(-0.071 \times ((5-5)^2 - (5-1)^2)) = 3.11$.

whether entrepreneurs increased, decreased, or did not change their entrepreneurial passion between waves. The *linear* and *quadratic shape* effects address passion itself and control for the basic shape of an entrepreneurs' passion over time. While a significant (and positive) *linear shape* effect indicates that entrepreneurs prefer more extreme values of passion, a significant (and negative) *quadratic shape* effect indicates the general preference for mid-ranged values of entrepreneurial passion (Ripley et al., 2022). We found no clear preference for passion for founding (i.e., Model 1–3; all *p*'s = n.s.), yet entrepreneurs in our sample expressed a more unimodal trend towards mid-range values of passion for inventing (i.e., Model 4–6; Model 4: -0.203, $p < .05$).

Finally, to test for social contagion, we employed the *average alter* effect which captures the tendency for entrepreneurs whose network ties have higher average passion scores, to also score highly on passion, and thus become more similar to their network ties over time (Daza & Kreuger, 2021; Ripley et al., 2022). First, to test Hypotheses 2a and 2b, we modelled social contagion processes at the accelerator cohort level. Here, the modelled *average alter* effect is defined as the product of an entrepreneur's passion and the average passions of all entrepreneurs in the cohort to whom a tie exists (Ripley et al., 2022). We found a positive and significant effect for passion for founding (i.e., Hypothesis 2a) (Model 1: 0.724; $\chi^2(1) = 9.68$; $p = .002$), yet no significant effect for passion for inventing (i.e., Hypothesis 2b) (Model 4: 0.191; $\chi^2(1) = .26$; $p = .609$). This means that when comparing an entrepreneur whose ties are 0.724 units higher on passion for founding than network ties of another entrepreneur, the odds of increasing passion for founding compared to no change more than double ($exp(0.724) = 2.062$).

Second, to test Hypothesis 3a and 3b and model contagion from co-founders more specifically, we weighted the *average alter* effect by team membership coded as "1" if two entrepreneurs are part of the same startup team and "0" otherwise. Again, we found a

significant contagion effect for passion for founding (Model 2: 0.436; $\chi^2(1) = 7.72$; $p = .006$) but not for passion for inventing (Model 5: 0.303; $\chi^2(1) = 2.22$; $p = .136$). To test contagion from ties with cohort members that were not on the same startup team as the ego entrepreneur (henceforth: extra-team ties), we followed the procedure from step two but coded these extra team ties as "1" and team members as well as entrepreneurs to whom no tie exists as "0". We established no contagion effects for passion for founding (Model 3: 0.084; $\chi^2(1) = 0.13$; $p = .720$) nor passion for inventing (Model 6: -0.573; $\chi^2(1) = 1.48$; $p = .224$). Taken together, we carefully conclude that for passion for founding, contagion at the team level was stronger than contagion from ties outside the team. Passion for inventing was not contagious.

Selection versus Contagion

To better explain why socially connected entrepreneurs are more likely to exhibit similar passion for founding, we sought to understand the relative contribution of homophily selection and social contagion by decomposing network autocorrelation associated with each of these co-evolution mechanisms (Leszczensky & Pink, 2019; Steglich et al., 2010).[29] Network autocorrelation can be defined as the spatial correlation between attributes of actors (e.g., passion) within a network (Anselin & Bera, 1996; Haining, 2001). Consistent with prior work (e.g., Plummer & Acs, 2014), we measure network autocorrelation by computing Moran's *I*. Moran's *I* ranges from -1 to 1 whereby higher (lower) values indicate that socially connected entrepreneurs have similar (dissimilar) values in passion. A Moran's *I* of 0 indicates spatial randomness (see Appendix C: Table 17 for formula).

Specifically, we fit four SIENA models to our data. First, a *control* model that includes autocorrelation at Wave 1 as well as the effects of structural (e.g., reciprocity,

[29] We acknowledge that SIENA is not yet natively equipped to calculate effect sizes in the sense readers are familiar with from linear regression (e.g., R^2). The approach we take here, following Steglich et al. (2010), is currently the only known workaround to address limitations related to SIENA's specification of separate evaluation functions for network and behavior change (Ripley et al., 2022), the use of unstandardized parameters, and typically strong interdependencies between network effects (Snijders, 2001).

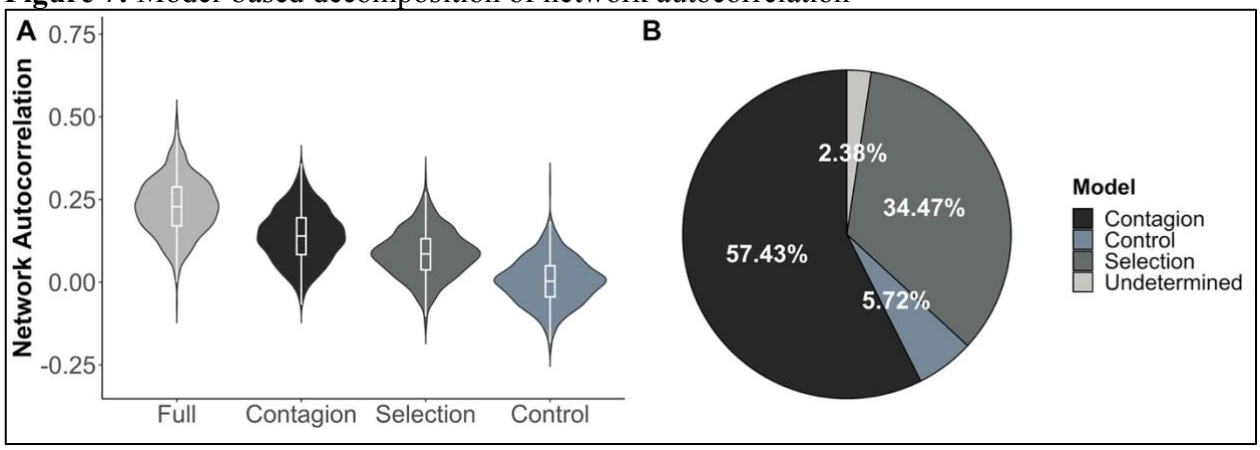
transitivity) and actor-level controls (e.g., sex, education). Second, a *selection* model that extends the control model and specifies homophily selection, but no social contagion processes. Third, a *contagion* model that specifies social contagion but no homophily selection. Finally, we fit a *full* model including both homophily selection and social contagion effects (i.e., Model 1 as reported in Table 10). We can then use comparisons between these models to compute the relative contribution of selection and contagion (Steglich et al., 2010). For example, by contrasting network autocorrelation in the full model (where selection and contagion are mutually controlled for) with network autocorrelation in the contagion model (where no selection occurs), we can ascertain how much the selection mechanism contributes to the clustering of entrepreneurs with similar levels of passion for founding.

Consistent with our main findings, network autocorrelation values for selection (I = 0.09) and contagion (I = 0.14) demonstrate that both homophily selection and social contagion explain why socially connected entrepreneurs have more similar values of passion for founding (see Figure 7, Panel A). For context, these findings are comparable in magnitude with autocorrelation observed in friendship formation of adolescents based on academic achievements (e.g., Brouwer et al., 2022; Kretschmer et al., 2018; Pink et al., 2020), as well as alcohol use and smoking behavior (e.g., Mercken et al., 2009; Steglich et al., 2010). To further facilitate interpretation, we follow prior work (e.g., Adams et al., 2022; Leszczensky & Pink, 2019) and convert autocorrelation values to percentages (see Figure 7, Panel B).[30] Hence, social contagion plays a slightly larger role in the development of passion similarity

[30] We assume that the total (100%) of autocorrelation accounted for by our models equals the difference between predictions of the control model (I = 0.00) and the full model (I = 0.23). Looking at the decrease (increase) in network autocorrelation compared to the full (control) model when excluding (including) respective selection and contagion effects, we can deduct that social contagion explains 57% of observed autocorrelation while homophily selection explains 34% of observed autocorrelation. The difference between the two calculations is shown as "Undetermined" in the pie chart.

(explaining around 57% of observed autocorrelation) while homophily selection is also an important contributor (explaining around 34% of observed autocorrelation).

Figure 7: Model-based decomposition of network autocorrelation



Note: Violin plot of determined network autocorrelation across control, selection, contagion, and full model for passion for founding (Panel A). Pie chart showing the relative sizes of the differences between the average predictions of a control model and a full model, allocated through simulations to the respective co-evolution mechanism (Panel B).

Discussion

In this paper, we study the co-evolution of social networks and entrepreneurial passion. Using a stochastic actor-oriented model (SIENA) and four waves of panel data from a university-based startup accelerator program, we were able to disentangle homophily selection and social contagion of entrepreneurial passion while controlling for other individual attributes as well as structural network effects. We found support for our hypotheses concerning passion for founding: (1) similarity in passion levels drives tie formation among peer entrepreneurs; (2) high passion for founding is contagious among peer entrepreneurs; and (3) this passion contagion effect is stronger among co-founders than among other peer relationships. Surprisingly, we do not find support for these hypotheses for passion for inventing.

Theoretical Contributions

The basic observation that socially connected individuals tend to share or have similar focal characteristics such as gender, age, or ethnicity is one of the most well studied effects in

the social sciences overall (e.g., McPherson et al., 2001) and a robust finding in entrepreneurship research as well (e.g., Ruef et al., 2003). Rather than focusing once more on such surface-level demographics, the similarity we address in this study is based on entrepreneurial passion (Cardon et al., 2009). The passion literature is indeed rife with demonstrations of how passion similarity (as opposed to diversity) between individuals is associated with positive outcomes, including entrepreneurial performance (e.g., de Mol et al., 2020), but less clarity exists about the underlying mechanism responsible for such similarity. For example, if we observe two connected entrepreneurs with similar passion at any point in time, how can this similarity be explained?

We first corroborate findings from a small but growing strand of passion literature that treats passion as interindividual rather than intraindividual emotion and has taught us that passion similarity is the outcome of a social contagion process (Hubner et al., 2020; Davies et al., 2017; Murnieks et al., 2016; Uy et al., 2021). We further extend this research that examined passion contagion from entrepreneurs to employees, investors, or team members, and show that passion spills over between peer entrepreneurs in an accelerator cohort, and that such contagion is bi-directional. This "network to passion" effect is important because it shows that peer entrepreneurs do not only constitute an important source of information, knowledge, and motivation (e.g., Chatterji et al., 2019; Hasan & Koning, 2019; Zuckerman & Sgourev, 2006), they are also an important source of entrepreneurial passion.

Crucially, next to contagion, we show that passion similarity can be explained as the outcome of a selection process as well. Although secondary to social contagion in our data, homophily selection explains a significant amount (approximately 34%) of network autocorrelation. In other words, entrepreneurs in our sample also attracted and selected peers who had similar levels of passion to begin with. This is not obvious because prior studies on passion contagion universally regard networks as static and do not capture who entrepreneurs

interact with outside the boundaries of their experimental setting. For example, Hubner et al. (2020) "manipulate" the relationship under study by exposing potential employees to video pitches of passionate (versus less passionate) entrepreneurs, whereas Uy et al. (2021) look at passion convergence processes after teams have already been formed. What these studies currently overlook is that while passion scores change over time, social networks change too (Greve & Salaff, 2003; Patzelt et al., 2021). In contrast, our intensive longitudinal study captured these episodes of peer interactions and entrepreneurial passion dynamics over several months (Bergman & McMullen 2021), allowing an estimation of the likelihood that self-selection determines observed passion similarity. Indeed, we find that entrepreneurs are more likely to send network ties to those whose passion levels are similar rather than dissimilar to their own. Such passion-based homophily selection (i.e., "passion to network") is valuable because identifying and understanding the criteria entrepreneurs actively select peers on is important to appropriately leverage social interactions between entrepreneurs across various social settings including accelerators, incubators, startup competitions, hackathons, and so on. For example, homophily selection based on passion matters, because accelerator design elements such as public pitches, shared progress meetings, or open workspaces (see Cohen, Bingham et al. 2019) all unfold "via the social connections of entrepreneurs to other entrepreneurs" (Hallen et al., 2020: 397). Thus, passion similarity may be seen as a potentially important gateway to these resources and the effectiveness with which startup accelerators can facilitate a productive peer environment may partly hinge on the distribution of entrepreneurial passion among cohort peers.

Moreover, viewing selection and contagion mechanisms in concert has interesting implications for issues of endogeneity, whereby factors seen as causing a certain outcome are also partly dependent on the outcome (Borgatti & Halgin, 2011). We show, based on passion, that whenever networks and actor characteristics are dynamic and can occur in practice,

researchers need to consider both selection and contagion to rule out alternative explanations (Steglich et al., 2006). For example, research on accelerators consistently finds that what happens during the acceleration period (i.e., program-specific effects such as mentoring, educational elements, or social events) affects startup performance (Assenova, 2020; Cohen, Bingham et al., 2019). However, recent work also finds a significant reduction in the magnitude of these program-effects when controlling for cohort effects, suggesting that the initial selection of startups into an accelerator plays an important role in determining how successful these startups may become (Avnimelech et al., 2021).

Therefore, the implication of relaxing the assumption of initial passion dissimilarity (i.e., selection) is that strong contagion effects documented in past experimental research might be more modest in reality. For example, in the aforementioned Hubner et al. (2020) study, the authors artificially expose participants (i.e., egos) to more or less passionate entrepreneurs (i.e., alters) and show stronger contagion effects if initial dissimilarity between ego and alter is higher. The authors carefully note that "a more detailed analysis of the (self-) selection mechanisms in future research could provide a better understanding (…) on the possibilities for contagion" (Hubner et al., 2020: 1133). Responding to this call for research, our more detailed analysis of selection mechanisms suggests that passion dissimilarity as a starting point for contagion is far less realistic, because homophily selection on passion makes large initial differences in passion levels less likely (see Footnote 23 for a numeric example).

Finally, homophily selection and social contagion of passion for founding, as well as the absence of these in passion for inventing, positions entrepreneurial passion as an important variable for consideration in studies on entrepreneurial teams (e.g., Lazar et al., 2020; Patzelt et al., 2020; Ruef et al., 2003). Here, our findings that teams are a critical vector for the transmission of entrepreneurial passion echo prominent warnings that "entrepreneurs

may want to think about the passions of those whom they invite to join the [new venture team]" (Cardon, Post et al., 2017: 299). However, much of the literature about entrepreneurial teams tends to treat team configurations as exogenous or predetermined so that characteristics of its members may be used as a starting point while staying "largely silent on how teams are formed in the first place" (Lazar et al., 2020: 51). Our findings are therefore relevant to the formation strand of the entrepreneurial team literature which posits that, entrepreneurs can select co-founders based on similarity-attraction or resource-seeking strategies (Lazar et al., 2021). Whereas similarity-attraction suggests a supplementary fit as co-founders select each other because they share similar attributes (Ruef et al., 2003), and return the sentiment of liking (Byrne, 1971), resource-seeking means co-founders are complementary as they are selected based on the knowledge, skills, and capabilities (i.e., resources) necessary for the creation of a new venture (Davidsson & Honig, 2003; Mosey & Wright, 2007). We add entrepreneurial passion to this conversation about how teams are formed. Specifically, we find that while passion for founding can act as an attractor and then organically "grow" through social contact with other passionate founders, passion for inventing might have to be purposefully selected for when forming a team.

Practical Implications

An array of entrepreneurial actors and programs including investors, accelerators, and incubators aim to facilitate startups and improve their performance (Cohen & Hochberg, 2014). To do so, they invest significant resources in selecting, building, and maintaining entrepreneurial teams as well as the creation of a supportive peer environment (Cohen, Bingham et al., 2019). By demonstrating that passion for founding is contagious, we position this passion domain as a potential quality differentiator between those programs. To the extent that passion for founding captures the desire to acquire resources and ultimately found a new venture, social contact with other entrepreneurs might not only provide the tools and

knowledge to create a new venture, but also make the founding process more motivating and enjoyable. Therefore, our findings might help explain why some accelerators, such as the prestigious Y Combinator program, stimulate broader peer network formation by organizing informal events such as weekly dinners for all the entrepreneurs in the cohort (van Rijnsoever, 2020; Y Combinator, 2005). Program managers would do well to organize events where (highly) passionate entrepreneurs in the cohort could demonstrate their passion (for founding) to their peers, for example by pitching their startup or sharing more general (positive) experiences of being an entrepreneur.

Limitations and Future Research

Although the accelerator program we studied provides an exceptional research setting and controls for potential structural and actor-level differences of participating entrepreneurs, it nevertheless has its own peculiarities that may have influenced the generalizability of the results.

First, we cannot rule out that participants were in contact with other entrepreneurs outside the boundaries of the accelerator program we studied such as former cohort members, guest speakers, mentors, or entrepreneurial parents (Becker et al., 2019; Hallen et al., 2020; Eesley & Wang, 2017), all of whom may have influenced their level of entrepreneurial passion. Still, if anything, the fact that we can identify the hypothesized effects despite potential unobservables is encouraging and renders our results more conservative.

Second, we investigate passion of entrepreneurs with startups at the conception stage (Fisher et al., 2016). While recent work goes so far as to suggest that passion domains could be safely aggregated to predict relevant entrepreneurial outcomes (Zhao & Liu, 2022), we find that differences between passion domains matter in our context. Passion for founding is both a driver of network tie formation and socially contagious among entrepreneurs, whereas similar effects for passion for inventing were not observed in our sample. Although

speculative, it seems plausible that the accelerator program under study, with its focus on founding-related activities (Cohen & Hochberg, 2014), might have primed entrepreneurs' founder identities as the most salient to "push down" the inventor identity in the hierarchy of role identities (Murnieks et al., 2012; Powell & Baker, 2014). In addition, passion for inventing could have unfolded "behind the scenes," because several startup teams in our sample were working towards digital products and services (e.g., digital solutions, software as a service etc.) rather than tangible, physical objects for which invention activities are more observables to peers. This calls attention to social context as an important, yet underexplored, boundary condition that either affords or hinders the relevance of passion for founding versus passion for inventing. Future research might examine whether a) early-stage incubators that focus strongly on "inventing" activities (Mian, 1997) or b) interstitial spaces such as the "Homebrew Computer Club"—which both include collective experimentation in close proximity to others (Furnari, 2014)—stimulate an inventor identity. Similarly, future research might examine later stage scale-up programs, with their focus on growth (cf. Mathias & Williams, 2018), which may be more likely to elicit an entrepreneur's "developing" identity.

Third, our theorizing was centered around passion as positive emotion. However, homophily selection and social contagion based on passion between peers in accelerator programs might also have a darker side if cohorts become socially stratified based on role identities and passion levels. According to Burke and Reitzes (1991), people not only seek out activities consistent with their salient role identity, they also refrain from engaging in activities that are inconsistent and therefore distract from that salient identity. Therefore, a salient role identity will motivate entrepreneurs to favor certain activities, creating more opportunity to connect with likeminded others. This possibility invites future research on accelerator cohort dynamics (e.g., Yu, 2020). In addition, similar to more positive manifestations of entrepreneurial passion, obsessive forms of passion might also be

contagious. Obsessive passion has been shown to affect psychological well-being, leading to stress and causing work-life conflict as entrepreneurs lose conscious control over their engagement in entrepreneurial activity (Vallerand, 2008; 2012). Obsessive engrossment in entrepreneurial activity may take up disproportionate amounts of time at the cost of other activities and create interpersonal pressure compelling others to engage in similar behavior (cf. Vallerand et al., 2007). Perhaps future research could follow this line of reasoning and begin to explain why entrepreneurs in accelerator programs find themselves: "often working seven days a week, doing little else but work and sleep" (Cohen & Hochberg, 2014: 10).

Conclusion

We study social contagion of entrepreneurial passion between peer entrepreneurs in an accelerator cohort while controlling for (homophily) selection effects and other social network dynamics. A better understanding of the social dynamics of entrepreneurial passion is crucial, given passion's impact on individual, team, and venture level outcomes. Our findings are promising, as they point to the potential passion for founding (but not inventing) has to steer the formation of peer ties as well as be transferred from one entrepreneur to another across these ties. In other words, when peer entrepreneurs show passion similarity, both selection and contagion effects are likely at play.

— CHAPTER 6 —

Discussion and Conclusion

In my dissertation, I explored how mentors and peers form social network ties and influence founders. Because mentors and peers pose a critical source of knowledge and inspiration for founders (e.g., St-Jean, 2011; Zuckerman & Sgourev, 2006), startup accelerators – the empirical setting of my dissertation – invest significant resources into building a diverse mentor pool and stimulating a conducive peer environment (e.g., Cohen, Bingham et al., 2019; Hallen et al., 2020). Chapter 2 presented a theoretical framework for the development of startup mentoring relationships. The following three empirical papers explored network processes from mentors and peers to participating founders: Chapter 3 analyzed mentors' willingness to mentor, Chapter 4 studied the effect of switching to an online accelerator program (due to COVID-19) on the development of peer networks, and Chapter 5 examined the co-evolution of peer networks and entrepreneurial passion within a single accelerator cohort. This final part – Chapter 6 – reviews key findings, discusses their contributions, and outlines future research prospects.

Summary of Findings and Contributions

The first research question outlined the need to understand startup mentoring as a distinct phenomenon. An analysis of extant mentoring research within entrepreneurial as well as corporate mentoring settings (e.g., Haggard et al., 2011; Kram, 1985; St-Jean, 2011) exposed the conceptual differences as a starting point to understanding how startup mentors and founders form and develop their relationships. Specifically, current views of startup mentoring as a short-term service in programs like accelerators (Bliemel et al., 2021; Cohen & Hochberg, 2014) do not align with the widely accepted fact that mentoring relationships develop over time, unlocking more personal psychosocial support (Kram, 1983; 1985). To address this challenge, Chapter 2 presented social exchange theory as a basis for understanding the development process of startup mentoring relationships. We suggested that startup mentors form both instrumental and affective relationships with founders.

Instrumental relationships provide development support, while affective relationships provide both development and psychosocial support. The trajectory of the relationship – whether it follows an instrumental or affective path – is determined by (1) mutual identification based on similarity; (2) repeated successful resource exchanges; (3) the stage of the founder's startup. Overall, our theory elucidates the dual dimensions that characterize mentor-founder relationships, how reciprocal exchanges can foster relationship growth over time, and how the types of resources exchanged influence mentees and their startups. By taking into account contingencies to these relationships, our paper has the potential to inform future research and enhance understanding of mentoring processes within entrepreneurship.

Our conceptualization of startup mentoring as a process of bi-directional resource exchange that stimulates the development of a deeper mentoring relationship between mentors and founders contributes to a growing body of research on entrepreneurship as a socially embedded phenomenon (e.g., Greve & Salaff, 2003; Huang & Knight, 2017; Ulhøi, 2005). Unlike existing contributions that adapt an outcome-centric view on startup mentoring (e.g., Assenova, 2020; Ozgen & Baron, 2007; Del Sarto et al., 2022), our process model specifically acknowledges the idiosyncratic nature of each startup mentorship. For example, Assenova (2020) demonstrates that mentoring leads to an increase in revenue and profits for founders a year after receiving support. However, the impact decreases if the founder has prior knowledge and experience. This has interesting implications for founders who may benefit from having a diverse mentor portfolio as needs for resources can shift and the importance of emotional and practical support can vary over time (Huang & Knight, 2017). For example, a mentor who is an experienced entrepreneur may add more value to a novice founder, but their entrepreneurial experience may not hold as much value for a mentee who is a serial founder.

In addition, our study has interesting implications for research on accelerator programs that offer mentoring as standard service (e.g., Bergman & McMullen, 2021; Cohen & Hochberg, 2014), yet do not standardize how mentoring is organized. For example, Cohen, Bingham et al. (2019) propose that accelerators which concentrate mentor interaction in the early weeks of the program, rather than throughout, enhance founder learning. This is due to the ability of founders to integrate mentor feedback instead of being continuously redirected. Our model raises questions, however, about whether such frontloaded, concentrated consultation provides mentors and founders with the opportunity for continued resource exchange they need to develop deeper relationships (Bliemel et al., 2021). In other words, providing feedback at the outset of the accelerator can be helpful in establishing a clear course of action, making it particularly useful for expert mentor relationships. However, it may impede the development of strong affective relationships between lead mentors and mentees.

Finally, our theorizing opens a new angle on mentoring research by assuming that who mentors are, and what mentors want, may influence relationship development (Haggard et al., 2011). For example, previous research suggests that mentoring can be motivated by a desire to give back or seek recognition, but it can also serve as a means to achieve tangible outcomes such as due diligence or financial compensation (Bliemel et al., 2021; Sanchez-Burks et al., 2017). Hence, we outline valuable practical implications for founders seeking mentor support and for delineating the different kinds of mentoring relationships within startup settings.

In empirically elaborating on the ideas that we proposed in Chapter 2, the study presented in Chapter 3 employed a conjoint experiment with 1,632 observations from 102 startup mentors to examine mentors' willingness to mentor based on founders' indicators of competence and relationship quality. In addition, we assessed how the degree of intrinsic,

prosocial, and extrinsic motivations of mentors influenced the selection process as moderators. Results showed that mentors choose founders based on their entrepreneurial experience and the external recognition of their startup as a marker of competence, as well as on relationship quality factors such as coachability and gender concordance. Coachability was the most influential factor for mentors in our sample. Furthermore, the effect of gender concordance was contingent on intrinsic mentoring motivation, while external recognition was linked to prosocial mentoring motivation, with higher mentoring motivation providing protection against gender discordance and low recognition.

An implication of these findings is that in explaining mentee selection by mentors, there is a need, first, to distinguish between different dimensions of attributes, and second to distinguish between different types of mentoring motivation. First, although both competence and relationship quality indicators play a role in mentors' choice to support startup founders, attributes within these dimensions are not equally important. Previous studies repeatedly position investors as a prominent population of startup mentors (e.g., Cohen, Fehder et al., 2019; Hallen et al., 2020) taking on mentoring roles given their particularly suited skill set and knowledge background (e.g., Mitteness et al., 2012; Politis, 2008; Sapienza, 1992). Given their vested interest, these studies also point out that investors prefer competence indicators over indicators of relationship quality (Svetek, 2022; Warnick et al., 2018). Interestingly, mentors – including a significant proportion (i.e., approximately 48%) of startup investors – did not prioritize competence indicators, emphasizing the developmental nature of startup mentoring relationships.

Second, our study extends the growing research on startup mentoring (e.g., Assenova, 2020; Ozgen & Baron, 2007; Scott et al., 2020) by incorporating mentoring motivations as a moderator in the relationship between competence and relational quality indicators and founder selection. To date, only Scott et al. (2020) have studied mentor preferences, finding

that mentors are incredibly selective expressing interest in only four percent of startups in general. In particular startups that have a clear value proposition (e.g., cost-saving innovation), have achieved milestone progress (e.g., filed a patent), and are founded by more educated entrepreneurs (e.g., PhDs/postdocs versus undergraduates) are more likely to receive mentoring support. Weaker startups and their founders would be left out. Our study challenges these assumptions by considering the compensatory effect of mentoring motivations and how they can explain how less competent founders or those with lower relationship quality can still receive mentoring support. The implications extend beyond founders seeking mentor support to the selection of mentors as crucial support providers in accelerator programs (e.g., Cohen & Hochberg, 2014). It is important to note that not all accelerators operate with the same motives, such as for-profit versus social accelerators (e.g., Pandey et al., 2017; Pauwels et al., 2016). Therefore, different types of mentors may be better suited for achieving specific accelerator goals.

In Chapter 4, we analyzed the impact of moving from an in-person accelerator to an online accelerator on peer entrepreneur networks. Based on the absence of proximity (e.g., Festinger et al., 1950; Roche et al., 2022) and disrupted interaction rituals (e.g., Goffman, 1967; Krishnan et al., 2020), we expected the online accelerator to exhibit lower network connectivity and be more clustered. To test these hypotheses, we compared two consecutive cohorts of the same accelerator, one pre-COVID-19 (offline) and one during COVID-19 (online). Results showed that the online cohort's peer entrepreneur networks became less connected as the program progressed, evidenced by lower density, reach, and higher clustering compared to the offline cohort. For example, the average entrepreneur in the offline cohort interacted with five peers at the end of the program and could reach 45% of the cohort by three degrees of separation, while in the online cohort, the average entrepreneur

interacted with only three peers, mainly within their own team (i.e., online more clustered), and only 19% of the cohort could be reached in three steps.

Our study addresses the need for research to assess the longitudinal effects of accelerator interventions on peer-to-peer networks (e.g., Bergman & McMullen, 2021). Specifically, our findings do not support the notion that digital technologies have the potential to amplify peer networking by removing constraints of physical location and lowering communication and coordination costs (Rippa & Secundo, 2019; Soluk et al., 2021; von Briel et al., 2018). Despite immense technical aptitude and founders' notorious flexibility in times of crises (Davidsson et al., 2021), the network structures developing throughout the accelerator cohorts we observed were different, with the online cohort seemingly in a disadvantageous position with respect to connectivity. With that in mind, our study also advances the view of network connectivity differences between virtual and in-person programs (Felzensztein et al., 2010; Grimaldi & Grandi, 2005; von Zedtwitz & Grimaldi, 2006) as a pivotal boundary condition affecting theories about social networks in entrepreneurship and specifically in the startup accelerator context (e.g., Dushnitsky & Sarkar, 2018).

In addition, we also speak to literature on entrepreneurial network formation (e.g., Elfring & Hulsink, 2007; Slotte-Kock & Coviello, 2010; Vissa, 2012). In particular, our findings indicate that social connections between participating founders are an expression of how the design of an accelerator program gives opportunity to form and maintain social connections (Hasan & Koning, 2019; Krishnan et al., 2020). Although we regard the entrepreneur peer network and its structural evolution as dependent variable (Slotte-Kock & Coviello, 2010), we can also carefully speculate that the online peer network embeds less relational social capital (e.g., trust, norms of collaboration) (Nahapiet & Ghoshal, 1998). Essentially, repeated interactions provide opportunities for entrepreneurs to observe and

interpret each other's behavior and gauge non-verbal communication, particularly about emotions, cooperation, and trustworthiness (Podolny, 1994; Storper & Venables, 2004). While more frequent encounters in the offline cohort can act as the spark that lights the fire of reciprocity (Engel et al., 2017), fewer opportunities to interact online interrupt ritual chains and means cohort entrepreneurs have a harder time to recognize their shared identity (Krishnan et al., 2020; Molm et al., 2007).

Chapter 5 was concerned with modeling the co-evolution of social networks and entrepreneurial passion for founding and inventing of founders embedded in a startup accelerator. Prior studies on passion had previously established passion as interindividual emotion (Murnieks et al., 2020) to spill over from entrepreneurs to employees (e.g., Hubner et al., 2020) and to converge among co-founders (e.g., Uy et al., 2021). However, because in these studies social connections (i.e., networks) between founders and employees were static as opposed to being dynamic (Greve & Salaff, 2003), issues of endogeneity remained. For example, next to contagion, founders could have also attracted and formed network ties with others who were similarly passionate to begin with (Hubner et al., 2020). By mutually controlling for homophily selection and social contagion processes, we showed that both mechanisms explain similarity in passion for founding in connected individuals (Steglich et al., 2010. In addition, by decomposing network autocorrelation (i.e., spatial correlation between passion of founders), we extended that selection explained approximately 34% while contagion explained approximately 57% of this observed similarity. Finally, we found that passion contagion is stronger among co-founders on the same startup team than among peer relationships with other founders in the cohort. No similar mechanisms were found with respect to entrepreneurial passion for inventing.

An implication of this study is that when network and actor characteristics are dynamic (such is the case of entrepreneurial passion), we need to think about both contagion

and selection mechanisms (Steglich et al., 2006). If prior studies explain passion similarity in connected founders based on contagion (e.g., Uy et al., 2021), they overlook the possibility that passionate founders could have attracted and selected others with similar passion at outset. Ignoring selection mechanisms raises concerns of endogeneity, where factors affecting an outcome are also affected by the outcome (Borgatti & Halgin, 2011). If only contagion is used to explain similarity, contagion effects may be overestimated because selection is "switched off" (Hubner et al., 2020).

We also add to the literature on peer entrepreneurships (e.g., Cai & Szeidl, 2018; Lerner & Malmendier, 2013; Zuckerman & Sgourev, 2006) as well as to the literature on how entrepreneurial teams are formed (e.g., Lazar et al., 2020; Patzelt et al., 2020; Ruef et al., 2003). With regards to the former, we extend that peers not only play a significant role as a source of information, knowledge, and motivation (e.g., Chatterji et al., 2019; Hasan & Koning, 2019; Zuckerman & Sgourev, 2006), yet also as a source of entrepreneurial passion. With regards to the latter, our findings show that co-founders are a significant source of spillover for entrepreneurial passion for founding, but not for inventing. This highlights the importance of founders considering the passion of new team members when forming their founding team (Cardon, Post et al., 2017). However, much of the literature on entrepreneurial teams assumes that the team's composition is set and does not address the formation process (Lazar et al., 2020). Our findings contribute to the formation aspect of the literature, which suggests that founders choose co-founders based on either similarity-attraction or resource-seeking strategies (Lazar et al., 2021; Ruef et al., 2003).

Future Research Prospects

The aim of entrepreneurship research is to understand the interactions between opportunities, individuals, modes of organization, and the market environment (Busenitz et al., 2003; Shane & Venkataraman, 2000). In this context, I examined the relationship and

impact of mentors and peers on founders through one conceptual and three empirical studies. Although in each of these four studies I highlighted opportunities for future research, below I also provide an overview of potential avenues for future research based on reflections on the overarching implications of the findings in each of these separate studies in my dissertation.

First, it would be interesting to study how different mentoring practices within accelerators interact with one another. In their pivotal study, Cohen, Bingham et al. (2019) argue that ensuring active interaction among peers and a high level of peer disclosure (e.g., public progress reports, open workspaces) are associated with positive startup outcomes. At the same time, Cohen, Fehder et al. (2019) reviewed core design choices within accelerator programs and established large differences in the way mentoring was organized. While some programs connect founders to program managers or mentors on an ad hoc basis only, other programs rigorously whiplash founders with feedback from more than 100 mentors. This opens up several avenues for further theorizing and empirical research on the complementary (i.e., high levels of peer disclosure and mentoring strengthen each other) versus compensatory (i.e., high levels of peer disclosure might offset low levels of mentoring or vice versa) nature of these different practices. For example, because peers and mentors offer comparable support to mentees (Higgins & Kram, 2001), it is possible that the effect of peer disclosure may be substitutable and thus reduced in programs with intense mentoring.

Second, there is a need for research to examine the evolution of mentor relationships in the life cycle of a startup (Kazanjian, 1988). This includes investigating whether changes occur through new relationships forming or existing relationships shifting in focus. To identify the unique constellation of relationships that may exist, future studies could employ a longitudinal lens capturing founders' developmental networks more broadly (Higgins & Kram, 2001). It may well be that founders employ a portfolio of startup mentors including a balanced mix of a few carefully selected, affective relationships and several, more

instrumental relationships. On the one hand, it would be interesting to discern how temporally stable or robust different kinds of mentoring relationships are. For example, moving out of an accelerator or otherwise increasing the cost of staying in contact, could be more detrimental to instrumental mentoring relationships (Young & Perrewé, 2000; 2004). On the other hand, scholars could explore contingencies affecting the formation and constellation of such development portfolios. Because startup mentoring is about supplementing gaps in the human capital of mentored founders (Assenova, 2020), future research could study if inexperienced founders are more likely to strategically seek out instrumental mentorships to compensate for their lack of experience.

Third, previous studies have emphasized how mentoring may increase founders' ability to recognize opportunities (Ozgen & Baron, 2007), provide clarity on how to test and maximize learning from entrepreneurial experimentation (Agrawal et al., 2021), help founders to build knowledge (Assenova, 2020), and become more self-efficacious (St-Jean & Tremblay, 2020). Consistent with the overarching theme of this dissertation, future research could extend the scope towards network-related outcomes of having a mentor. For example, Krishnan et al. (2020) and Kuratko et al. (2021) have argued that mentors supplement gaps in founders' social capital by introducing founders to contacts they would have been unlikely to meet – or by endorsing founders to others as worth interacting with and inducing a connection (Coleman, 1988; Granovetter, 1963). However, to date, we do not yet know empirically if mentor referrals indeed broaden founders' networks, and which other factors influence such network brokerage. For example, future studies could consider variables such as trust (Smith, 2005) and mentor's orientation towards individual gain (building ties for personal advantage) versus facilitating tie formation between others (tertius iungens networking orientation) (Ebbers, 2014), as these may play a role in moderating networking behavior.

Finally, it would be interesting to study mentoring and mentor networks in related entrepreneurship programs (for an overview of entrepreneurship programs, see Bergman & McMullen, 2021). In particular, incubators would be a logical extension to this dissertation because incubators offer similar services as accelerators (e.g., co-location, mentorship, business assistance), albeit on a more ad hoc basis and over a much longer timeframe (Mian et al., 2016; Pauwels et al., 2016). For example, while founders complete accelerator programs in three to six months, they typically reside within incubators for several years (Cohen, Fehder et al., 2019; Hackett & Dilts, 2004). This longer duration makes incubators an exceptional research setting because the time frame is much more aligned with the several years necessary to develop a mentoring relationship within corporations (Kram, 1983). Furthermore, while other incubator tenants are undoubtedly entrepreneurial peers, there are parallels to corporate mentoring in the incubator model. Specifically, because the selection of tenants into incubators is acyclic, occurring at no fixed point in time (e.g., Cohen & Hochberg, 2014), there will be a much more diverse set of founders in terms of program seniority in incubators compared to accelerators. This, again, is more aligned with corporate mentoring in which more experienced, senior individuals take on a less experienced, junior individuals to show them the ropes (Haggard et al., 2011).

Conclusion

Promoting entrepreneurship is the fundamental aim for various institutions, including accelerators, but also policy makers, educational programs, investors, and others who gain from entrepreneurial activity. Hence, understanding not only how, but also by the help of whom and with what effects is essential (Shane & Venkataraman, 2000; Venkataraman, 1997). In my dissertation, I set out to examine "how peers and mentors connect and influence entrepreneurs." Specifically, I analyzed how founders' characteristics such as entrepreneurial passion, competence cues, and indicators of relationship quality, but also environmental

factors such as working online, influenced the formation of entrepreneurial support networks (and in the case of passion are influenced by these networks in return). As entrepreneurial support networks are crucial to the success of startups (e.g., Hoang & Antoncic, 2003; Slotte-Kock & Coviello, 2010), and will likely continue to be a subject of intense research in the future, I hope my findings will inform future scientific research as well as provide practical guidance on how to design effective entrepreneurship and mentoring programs that support all participating founders.

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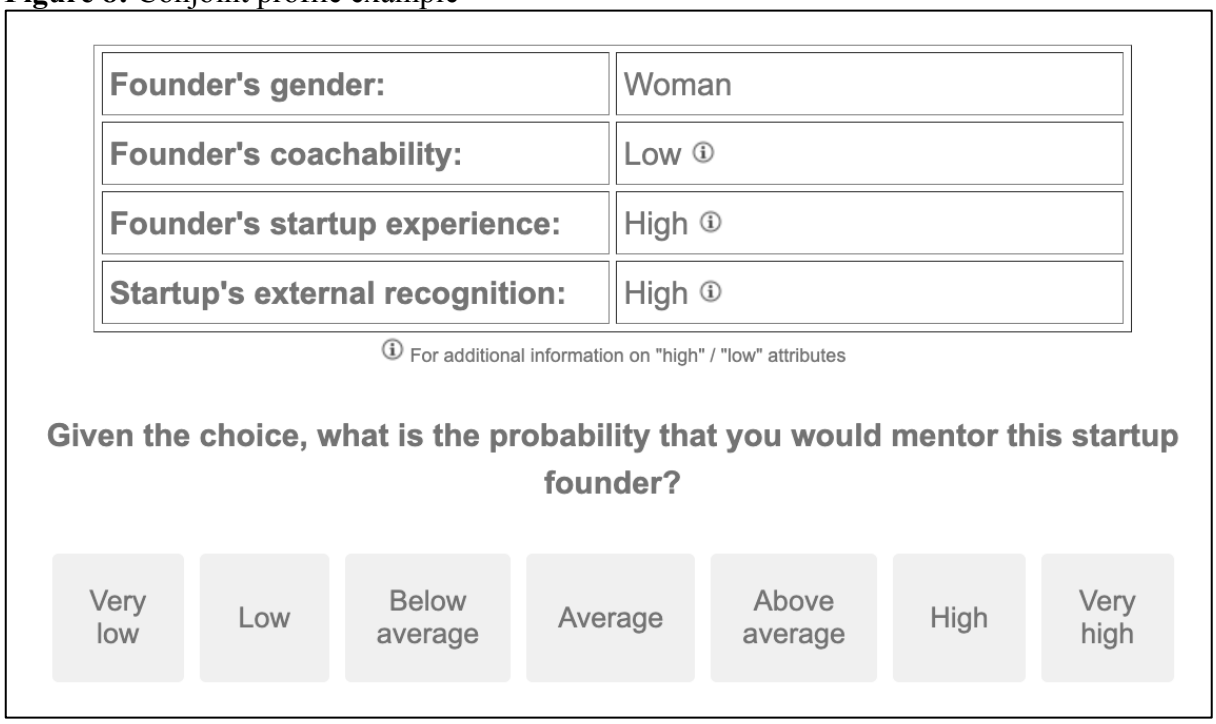
Appendices

Appendix A: Who gets a mentor?

Conjoint Profile Example

You are evaluating a new venture being started by a **woman** who has prior experience starting and developing new businesses (**high** startup experience relative to other founders) and is somewhat receptive to feedback (**low** coachability relative to other founders). This startup was rated at the top of its cohort by a panel of investors (**high** external recognition relative to other startups).

Figure 8: Conjoint profile example



Note: Mentors were first shown the full definitions of each of the high and low levels of all the founder attributes as shown in Table 3 in the manuscript. By moving their mouse/finger to the "ⓘ"symbol respondents could access a tooltip including the full description of the respective attribute at its respective level. The practice profile was used to familiarize respondents with the founder attributes and was excluded from the analysis. The subsequent 20 profiles (including 4 replicate profiles) omit descriptive paragraphs describing the founder in detail.

Table 11: Measures

Construct	Scale	α =	Items
Intrinsic Mentoring Motivation	4-item (Grant, 2008; 5-point Likert scale)	0.74	• Because I enjoy the work itself • Because it's fun • Because I find the work engaging • Because I enjoy it
Prosocial Mentoring Motivation	4-item (Grant, 2008; 5-point Likert scale)	0.73	• Because I care about benefiting others through my work • Because I want to help others through my work • Because I want to have positive impact on others • Because it is important to me to do good for others through my work
Extrinsic Mentoring Motivation	4-item (Deci et al. 1994; Ryan & Connell, 1989; 5-point Likert scale)	0.83	• Because I believe this activity could be of some value to me (*Adapted from:* I believe this activity could be of some value to me) • Because I think that doing this activity is useful for me (*Adapted from: I think that doing this activity is useful for {blank})* • Because I think doing this activity could help me to attain my professional goals (*Adapted from: I think doing this activity could help me to {blank})* • Because I believe doing this activity could be beneficial to me (*Adapted from: I believe doing this activity could be beneficial to me)*

Confirmatory Factor Analysis

To test that intrinsic, prosocial, and extrinsic mentoring motivations are distinct, we conducted confirmatory factor analyses using *lavaan* (Rosseel, 2012) in R with maximum likelihood estimation, following recommendations in the measurement literature (e.g., Bentler & Dudgeon, 1996). The three-factor model displayed better fit with the data, $\chi^2(51, n = 102) = 62.946$, CFI = .954, TLI = .941, RMSEA = .050, SRMR = .079 than a one-factor model, $\chi^2(54, n = 102) = 240.03$, CFI = .290, TLI = .132, RMSEA = .203, SRMR = .193 or a two-factor model with intrinsic and prosocial motivation combined $\chi^2(53, N = 102) = 115.68$, CFI = .761, TLI = .702, RMSEA = .109, SRMR = .127 (Grant, 2008). Supporting the three distinct components of mentoring motivation, the model fit improved significantly from the one-factor to three-factor model, $\Delta\chi2\ (\Delta3, n = 102) = 19.345$, $p < .001$ as well as two-factor model $\Delta\chi2\ (\Delta2, n = 102) = 71.418$, $p < .001$

Table 12: Estimated marginal means

Founder attribute (combination)	Level	Marginal mean	Standard error	95% Confidence interval	
				Low	High
Entrepreneurial experience × External recognition	Low-low	3.79	0.09	3.60	3.98
	Low-high	4.62	0.07	4.47	4.76
	High-low	4.20	0.09	4.02	4.38
	High-high	4.60	0.12	4.37	4.83
Gender Concordance × Coachability	Low-low	2.87	0.11	2.66	3.08
	Low-high	5.59	0.09	5.42	5.76
	High-low	3.02	0.11	2.80	3.23
	High-high	5.73	0.09	5.56	5.90
Entrepreneurial experience × Gender concordance	Low-low	4.12	0.08	3.96	4.28
	Low-high	4.28	0.08	4.13	4.44
	High-low	4.34	0.10	4.14	4.54
	High-high	4.46	0.10	4.26	4.66
Entrepreneurial experience × Coachability	Low-low	2.78	0.11	2.56	3.01
	Low-high	5.62	0.08	5.46	5.78
	High-low	3.10	0.12	2.87	3.34
	High-high	5.70	0.11	5.47	5.92
External recognition × Gender concordance	Low-low	3.96	0.08	3.80	4.12
	Low-high	4.03	0.08	3.87	4.19
	High-low	4.50	0.09	4.33	4.68
	High-high	4.71	0.09	4.54	4.89
External recognition × Coachability	Low-low	2.63	0.10	2.43	2.84
	Low-high	5.36	0.09	5.17	5.54
	High-low	3.25	0.12	3.02	3.48
	High-high	5.96	0.09	5.79	6.14

Note: DV = Willingness to mentor; Low gender concordance = discordance.

Appendix B: Going Online

Table 13: Structural comparison between offline and online accelerator cohort

	Cohort	
Design element:	Offline cohort	Online cohort
Cohort characteristics		
Target participants	Novice entrepreneurs with university affiliation	Novice entrepreneurs with university affiliation
Sign-up / Selection	Digital; several months before start of accelerator program	Digital; several months before start of accelerator program
Team formation	In person; during startup weekend (see below) but also in the weeks to follow. Program participants instructed to seek frequent conversations with peers. Team formation voluntary and informal.	Digital; during the beginning of the program but also in the weeks to follow. Program participants instructed to seek out group-based digital activities and join conversations with peers in online breakout rooms.
Education	In person; content delivered across general sessions for all participants around different topics and themes (e.g., growth hacking, startup finance).	Digital; On demand. Content provided online (VODs; information; articles).
Instructors	Accelerator management and staff	Accelerator management and staff
Workshops	In person; attendance voluntary	Digital; attendance mandatory
Guest speakers	In person	Digital
Coaching / Mentoring	In person; weekly sessions, attendance non-mandatory	Digital; weekly sessions, attendance mandatory
Key events		
Introductory event	*Startup weekend:* First official program element. Three-day long, offsite in-person social event for participants to get to know each other.	*Extended online icebreaker:* First week and a half of the program incorporated randomized breakout rooms and group-based activities to emulate in-person socializing.
Startup market	Promotion and pitch event. Offsite in-person social event for entrepreneurs to pitch their businesses to an audience of peers and the public.	Startup market cancelled due to COVID-19.
Demo day	In person; formal offsite pitch event attracting a large audience including investors, mentors, and press. Hosted at the end of the accelerator program.	Digital; event moved to Zoom. Hosted at the end of the accelerator program.

Table 14: Complete results offline versus online cohort (one-tailed tests)

	Wave 2			**Wave 3**			**Wave 4**		
Measures:	Offline M (SD)	Online M (SD)	Comparison Test statistic	Offline M (SD)	Online M (SD)	Comparison Test statistic	Offline M (SD)	Online M (SD)	Comparison Test statistic
H1 *Network connectivity*									
Reach									
$k = 1$ (Density)	0.053 (0.033)	0.054 (0.028)	$t(158.36) = -0.07$, $p = .529$, $d = 0.011$	0.054 (0.032)	0.050 (0.023)	$t(157.11) = 1.03$, $p = .152$, $d = 0.158$	0.053 (0.031)	0.042 (0.024)	$t(158.55) = 2.47$, $p =$ **.007**, $d = 0.380$
$k = 2$	0.204 (0.135)	0.171 (0.088)	$t(152.98) = 1.88$, $p =$ **.031**, $d = 0.286$	0.192 (0.129)	0.137 (0.094)	$t(157.33) = 3.12$, $p =$ **.001**, $d = 0.478$	0.202 (0.132)	0.103 (0.071)	$t(139.52) = 6.09$, $p <$ **.001**, $d = 0.910$
$k = 3$	0.475 (0.232)	0.366 (0.170)	$t(157.42) = 3.43$, $p <$ **.001**, $d = 0.526$	0.421 (0.227)	0.302 (0.187)	$t(158.96) = 3.63$, $p <$ **.001**, $d = 0.563$	0.452 (0.230)	0.187 (0.135)	$t(146.01) = 9.12$, $p <$ **.001**, $d = 1.372$
$k = 4$	0.713 (0.238)	0.592 (0.201)	$t(158.67) = 3.48$, $p <$ **.001**, $d = 0.541$	0.627 (0.257)	0.478 (0.238)	$t(156.07) = 3.80$, $p <$ **.001**, $d = 0.598$	0.655 (0.250)	0.279 (0.202)	$t(159) = 10.54$, $p <$ **.001**, $d = 1.634$
$k = 5$	0.836 (0.214)	0.760 (0.188)	$t(157.92) = 2.37$, $p =$ **.009**, $d = 0.371$	0.750 (0.258)	0.613 (0.265)	$t(150.43) = 3.30$, $p <$ **.001**, $d = 0.525$	0.772 (0.233)	0.356 (0.247)	$t(148.35) = 10.90$, $p <$ **.001**, $d = 1.738$
H2 *Clustering*	0.481 (0.322)	0.451 (0.339)	$t(142) = 0.55$, $p =$ .291, $d = 0.093$	0.555 (0.328)	0.606 (0.353)	$t(147) = -0.90$, $p =$ .815, $d = 0.148$	0.501 (0.338)	0.610 (0.363)	$t(143) = -1.87$, $p =$ **.031**, $d = 0.315$
Team network									
Number of teams	33	21		33	21		33	21	
Average team degree	2.788 (2.459)	2.238 (2.189)	$t(52) = 0.83$, $p =$ .204, $d = 0.233$	2.485 (1.80)	1.619 (2.156)	$t(52) = 1.59$, $p =$ .059, $d = 0.445$	2.546 (1.954)	1.000 (1.049)	$t(50.86) = 3.77$, $p <$ **.001**, $d = 0.986$

Note: d refers to the effect size of the difference (Cohen's *d).* Bold indicates significance at $p \leq .05$ (one-tailed).

Table 15: Complete results offline versus online cohort (two-tailed tests)

	Wave 2			**Wave 3**			**Wave 4**		
Measures:	Offline M (SD)	Online M (SD)	Comparison Test statistic	Offline M (SD)	Online M (SD)	Comparison Test statistic	Offline M (SD)	Online M (SD)	Comparison Test statistic
H1 *Network connectivity*									
Reachability									
$k = 1$ (Density)	0.053 (0.033)	0.054 (0.028)	$t(158.36) = -0.07$, $p = .943$, $d = 0.011$	0.054 (0.032)	0.050 (0.023)	$t(157.11) = 1.03$, $p = .304$, $d = 0.158$	0.053 (0.031)	0.042 (0.024)	$t(158.55) = 2.47$, $p =$ **.015**, $d = 0.380$
$k = 2$	0.204 (0.135)	0.171 (0.088)	$t(152.98) = 1.88$, $p = .062$, $d = 0.286$	0.192 (0.129)	0.137 (0.094)	$t(157.33) = 3.12$, $p =$ **.002**, $d = 0.478$	0.202 (0.132)	0.103 (0.071)	$t(139.52) = 6.09$, $p <$ **.001**, $d = 0.910$
$k = 3$	0.475 (0.232)	0.366 (0.170)	$t(157.42) = 3.43$, $p =$ **.001**, $d = 0.526$	0.421 (0.227)	0.302 (0.187)	$t(158.96) = 3.63$, $p <$ **.001**, $d = 0.563$	0.452 (0.230)	0.187 (0.135)	$t(146.01) = 9.12$, $p <$ **.001**, $d = 1.372$
$k = 4$	0.713 (0.238)	0.592 (0.201)	$t(158.67) = 3.48$, $p =$ **.001**, $d = 0.541$	0.627 (0.257)	0.478 (0.238)	$t(156.07) = 3.80$, $p <$ **.001**, $d = 0.598$	0.655 (0.250)	0.279 (0.202)	$t(159) = 10.54$, $p <$ **.001**, $d = 1.634$
$k = 5$	0.836 (0.214)	0.760 (0.188)	$t(157.92) = 2.37$, $p =$ **.019**, $d = 0.371$	0.750 (0.258)	0.613 (0.265)	$t(150.43) = 3.30$, $p =$ **.001**, $d = 0.525$	0.772 (0.233)	0.356 (0.247)	$t(148.35) = 10.90$, $p <$ **.001**, $d = 1.738$
H2 *Clustering*	0.481 (0.322)	0.451 (0.339)	*t(142) = 0.55, p =* .581, $d = 0.093$	0.555 (0.328)	0.606 (0.353)	$t(147) = -0.90$, $p =$ .370, $d = 0.148$	0.501 (0.338)	0.610 (0.363)	$t(143) = -1.87$, $p =$ .063, $d = 0.315$
Team Network									
Number of teams	33	21		33	21		33	21	
Average team degree	2.788 (2.459)	2.238 (2.189)	$t(52) = 0.83$, $p =$ .408, $d = 0.233$	2.485 (1.80)	1.619 (2.156)	$t(52) = 1.59$, $p =$ .117, $d = 0.445$	2.546 (1.954)	1.000 (1.049)	$t(50.86) = 3.77$, ***p* <** **.001**, $d = 0.986$

Note: Insofar as we predicted the online cohort to be less connected, we used one-tailed tests throughout the manuscript. This table reports results of two-tailed independent t-tests. *d* refers to the effect size of the difference (Cohen's *d)*. Bold indicates significance at $p \leq .05$. Generally, results mirror our findings in text. In contrast to a one-tailed test, the proportion of entrepreneurs reachable at Wave 2 was significant at the $p = .062$ rather than at $p \leq .05$ level. Similarly, clustering at Wave 4 was significant at the $p = .063$ rather than at $p \leq .05$ level.

Appendix C: Passion to Network or Network to Passion

Table 16: Sample characteristics

Variables	Wave One	Wave Two	Wave Three	Wave Four
Demographics / Controls				
Name	×	×	×	×
Startup Name		×	×	×
Age	×			
Sex	×			
Education	×			
Entrepreneurial experience	×			
IV, DV				
Entrepreneurial passion				
for founding	×	×	×	×
for inventing	×	×	×	×
Name generator (network)	×	×	×	×
Sample / Network				
Response rate[a]	95.51%	88.76%	96.63%	83.15%
Data collection	*Baseline* Early September (Pre-program)	*Start* Mid October (Teams formed)	*Midpoint* Late November	*End* Late January (Demo day)
Entrepreneurial passion				
Founding	17.57 (5.55)	18.38 (5.79)	17.50 (6.43)	16.35 (6.55)
Founding (rescaled)	3.74 (0.97)	3.87 (0.94)	3.73 (1.11)	3.54 (1.13)
Correlation	0.98	0.98	0.98	0.98
Inventing	19.21 (4.76)	18.25 (5.55)	18.36 (5.08)	17.47 (5.37)
Inventing (rescaled)	4.08 (0.82)	3.95 (0.93)	3.94 (0.87)	3.81 (0.92)
Correlation	0.97	0.97	0.96	0.96

Note: SIENA relies on categorical variables to model changes in behavior (i.e., passion). We range transformed passion scores : $z_{new} = \frac{(z_{old}-1)(new\ scale_{max}-new\ scale_{min})}{(old\ scale_{max}-old\ scale_{min})} + 1$ Rescaled scores were rounded to the closest integer number (see lower panel). For instance, a high (low) passionate entrepreneur with a score of 23.75 (6.75) would have her score transformed to $z_{new} = \frac{(23.75-1)(5-1)}{(25-1)} + 1 = 4.79\ (1.96)$ which would be rounded to 5 (2).

Table 17: Simulation Investigation for Empirical Network Analysis – Overview

Effect, short name in SIENA manual, and formula	**Effect definition:**
Structural network effects (controls):	*The tendency…*
Outdegree: *density* $s_1(x) = \Sigma_j\, x_{ij}$	… to form and maintain ties in general. This can be regarded as an intercept.
Reciprocity: *recip* $s_2(x) = \Sigma_j\, x_{ij}x_{ji}$	… to reciprocate ties. This is represented by the number of reciprocated ties (measure of mutuality).
Transitivity: *gwespFF* $s_3(x) = \Sigma_{j=1}^{n} x_{ij} e^{\alpha}\{1-(1-e^{-\alpha})^{\Sigma_{h=1}^{n} x_{ih}x_{hi}}\}$	… to form and maintain network ties to "friends of friends." This is represented by the number of shared connections *h* of a directed tie *i* to *j* (triad closure).
Indegree alter: *inPop* $s_4(x) = \Sigma_j\, x_{ij}x_{+j}$	… to attach to actors with high indegrees.
Outdegree alter: *outPop* $s_5(x) = \Sigma_j\, x_{ij}x_{j+}$	… to connect with entrepreneurs that nominate many others as ties.
Outdegree ego: *outAct* $s_6(x) = \Sigma_j\, x_{ij}x_{i+}$	… of entrepreneurs with many outgoing ties to nominate more entrepreneurs as tie.
Covariate and passion effects:	
Alter: *altX* $s_{7a}(x) = \Sigma_j\, x_{ij}v_j$	… to form ties with entrepreneurs with high values in that covariate. This can be regarded as covariate-related popularity effect.
Alter^2: *altSqX* $s_{7b}(x) = \Sigma_j\, x_{ij}v_j^2$ (continuous covariates)	
Ego: *egoX* $s_{8a}(x) = \Sigma_j\, x_{ij}v_i$	… of entrepreneurs with high values in a covariate to nominate more ties than entrepreneurs with low values in a covariate.
Ego^2: *egoSqX* $s_{8b}(x) = \Sigma_j\, x_{ij}v_i^2$ (continuous covariates)	
Same: *sameX* $s_{9a}(x) = \Sigma_j\, x_{ij}I\{v_i = v_j\}$	… of entrepreneurs to tie to similar others. This represents the number of ties of *i* to all other entrepreneurs *j* who have exactly the same covariate value (e.g., sex).

(Table continues on next page)

Table 17: (continued)

Effect, short name in SIENA manual, and formula	**Effect definition:**
	The tendency…
H1 Homophily: *diffSqX* $s_{9b}(x) = \Sigma_j\, x_{ij}(v_i - v_j)^2$(continuous covariates)	… of entrepreneurs to tie to others with similar levels of a continuous covariate (e.g., passion). This is represented as the squared alter-minus-ego difference of the covariate over all entrepreneurs to whom *i* has a tie.
Contagion effects:	
H2 Contagion: *avAlt* $s_{10a}(x) = z_i(\Sigma_j\, x_{ij} z_j)\ /\ (\Sigma_i x_{ij})$	… of entrepreneurs to have high entrepreneurial passion if tied to alters who have higher values of passion on average.
H3 Weighted contagion: *avAltW* $s_{10b}(x) = z_i(\Sigma_j\, x_{ij} w_{ij} z_j)\ /\ \Sigma_i w_{ij} x_{ij}$	… of entrepreneurs to have high entrepreneurial passion if tied to alters on the same startup team who have higher values of passion on average.
Network autocorrelation:	
$Moran's\ \mathrm{I} = \mathrm{n}\ \Sigma_{ij}\, x_{ij}(z_i - \bar{z})(z_j - \bar{z}) / \left(\Sigma_{ij}\, x_{ij}\right)(\Sigma_i\, (z_i - \bar{z})^2)$	… of network ties to cluster based on similarity in passion.

Note: The used effects $s_i(x)$ are numbered 1–10. $x_{ij} = 1$ indicates presence of a tie from entrepreneur *i* to *j*, while $x_{ij} = 0$ indicates absence of this tie. x_{+j} (x_{j+}) refers to all incoming (outgoing) ties of entrepreneur *j*. v_i (v_j) represents Ego's (Alter's) value of a covariate in the network selection part of the model. z_i (z_j) represents Ego's (Alter's) passion score in the social contagion part of the model. In effect 9a, the indicator function *I* equals 1 if ego and alter of a tie are of the same covariate value (e.g., sex); 0 otherwise. In effect 10b, $w_{ij} = 1$ indicates that both entrepreneurs are on the same startup team. For additional information as well as a detailed derivation and technical implementation of all effects, we refer to Ripley et al. (2022). For a practical example including effect interpretation, we refer to Steglich et al. (2010).

Robustness Testing

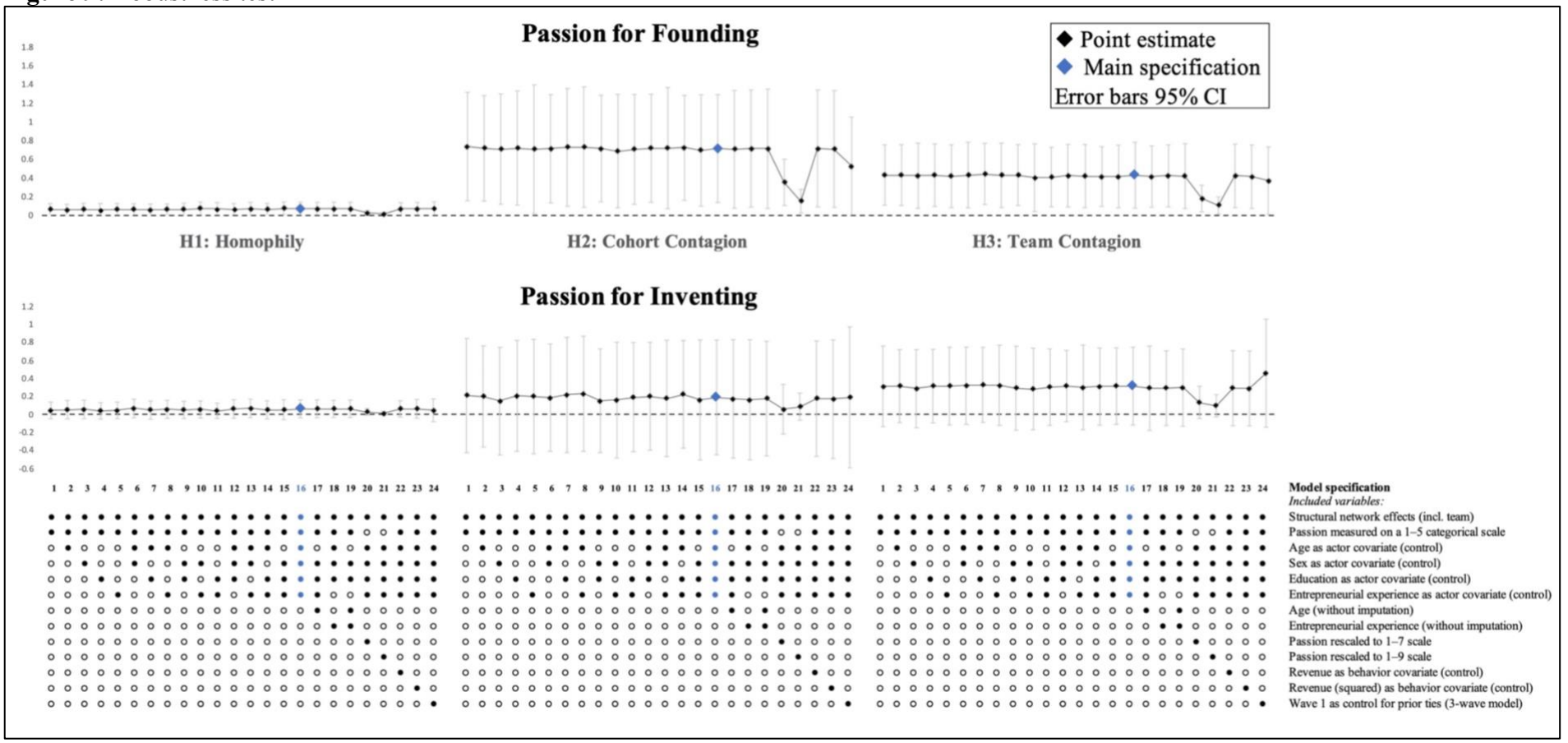
We draw on specification curve analysis (Simonsohn et al., 2020), to test the robustness of our main findings. Specification curve analysis graphically displays the results of our main effects (i.e., homophily selection and social contagion at cohort and team level) across various non-redundant theoretically justified and statistically valid SIENA models (Figure 9). All robustness models were gradually built to include more complex specifications while maintaining sufficient model convergence and data fit (Ripley et al., 2022). Homophily and contagion effects were significant at conventional levels across all 22 specifications. We note that homophily selection effects under Models 2, 4, 7, and 20 were significant at the $p < .10$ rather than at $p < .05$ level, likely because these specifications did not include key attributes for homophily selection such as shared sex or education background (McPherson et al., 2001).

Model 1 contains all structural network controls including outdegree-, reciprocity-, and transitivity effects, their interaction, as well as degree-related effects and the startup team membership yet no other actor attributes aside from entrepreneurial passion for founding and inventing, respectively. This is akin to a baseline model in regression without control variables. Models 2–16 gradually introduce actor level covariates (controls) including entrepreneurs' age, sex, education, and experience as well as combinations of these. Model 16 incorporates all structural network controls and actor covariates and represents the main model reported in the results section (Table 10). Models 17–19 are akin the main model but remove four entrepreneurs for which we imputed missing age and entrepreneurial experience data. Model 20–21 test for the robustness of our scale transformation by using a 1–7 (Model 20) and 1–9 passion scale (Model 21), respectively. Model 22–23 control for entrepreneurial performance (Uy et al., 2021). Entrepreneurs who invest more effort and perform better are more likely to develop and maintain

high levels of passion (Gielnik et al., 2015; Lex et al., 2020). Therefore, we included revenue data – which we obtained after the official end of the program – as an ego covariate (control) in the behavioral part of the model. Controlling for revenue (Model 22) and revenue squared (Model 23) did not alter our main effects in any meaningful way. We note here that because revenue was assessed at the level of the team and not measured throughout the program but captured only at its end point, it is inconsistent with the nature of our actor-oriented model and was therefore not included in its main specification. Model 24 controls for previous ties (Hasan & Koning, 2019) and mitigates potential concerns that Wave 1 is exogenous to homophily and contagion effects, as we obtained network and passion data in a baseline survey before the actual start of the program.

Finally, we also specified different contagion mechanisms such as the average similarity (avSim), the total alter (totAlt), and the total similarity (totSim) effect. Unlike *averaged* effects, *total* effects indicate that contagion is proportional to the number of alters and were therefore specified at the cohort level. In contrast to *alter* effects expressing that actors whose alters have a higher total value of the behavior *Z*, also have themselves a stronger tendency toward high values on the behavior, *similarity* effects indicate convergence to "meet in the middle" (Ripley et al., 2022). In line with our theorizing, passion (for founding) spills over from high passionate cohort peers (e.g., Model 1 – *totAlt*: 0.131; $\chi^2(1) = 6.04$; $p = .014$) but does not converge (e.g., Model 1 – *totSim*: -0.042; $p = 0.878$). In line with prior research (Uy et al., 2021), passion also convergences among entrepreneurs on the same startup team (e.g., Model 2 – avSim: 1.862; $\chi^2(1) = 5.45$; $p = .020$).

Figure 9: Robustness test



Note: Figure 9 demonstrates homophily selection, contagion, and team contagion estimates across different model specifications. SIENA measures homophily as squared differences indicated by a negative coefficient that was inverted to represent similarity and fit with the visualization (Schaefer & Kraeger, 2020). Models are gradually built according to the legend in the lower half. For example, Model specification 1 incorporates only data on entrepreneurial passion as well *structural network effects* including *team membership*. Model 16, which is the Main Model used in our manuscript, extends by including actor level covariates age, sex, education, and experience as controls.

Summary

Summary in English

Becoming a founder is a demanding process that involves longer working hours, intense time pressure, and high levels of complexity and uncertainty, which are much greater than those faced by employed professionals. Entrepreneurs must navigate varied decision-making problems, such as refining their business idea, developing a product or service, engaging with, and winning customers, assessing competitor, and acquiring necessary resources such as capital. To do so, founders can draw on the support of mentors, knowledgeable individuals with founding or otherwise relevant experience and founders of other startups who have made similar experiences for help.

Although research has shown that both, mentors and peers, can contribute to the development of founders and their startups, it remains unclear how social connections to mentors and peers emerge and subsequently influence founders. Important questions to consider include how mentors decide to support some startup founders and not others? What mechanisms enable founders to increase their chances of obtaining valuable mentor and peer support? And, to what extent access to mentors and peers can make founders better entrepreneurs? These questions are especially relevant given the potential value of entrepreneurship for society, and the significant resources that institutions such as startup accelerators invest in providing access to mentors and peers. In my dissertation, I take these questions seriously and investigate startup mentoring and peer support across one theoretical and three empirical studies.

As a starting point, Chapter 2 aimed to understand how startup mentors and founders form, and ultimately develop a relationship. I theorized that mentors can form both instrumental (providing practical support) and affective (providing emotional support) relationships with founders. The trajectory of these relationship depends on mutual identification, successful resource exchanges, and the stage of the startup. The paper

contributes to research on entrepreneurship as a socially embedded phenomenon by acknowledging the idiosyncratic nature of each mentorship. The study further highlights the importance of having a diverse mentor portfolio, as different mentors may provide unique value to founders depending on their prior knowledge and experience. Finally, the study raises questions about the best way to organize mentoring within accelerator programs to develop deeper relationships between mentors and founders.

In Chapter 3, I drew on a conjoint experiment to investigate what qualities mentors look for in startup founders and how their motivations impact their choices. Mentor preferences are an important antecedent of relationship formation and relevant because mentors are a key asset to founders who participate in entrepreneurship programs. Moreover, mentors are a scarce resource in startup ecosystems. Results showed that mentors choose founders based on their experience and external recognition of their startup as markers of competence, as well as on relationship quality factors such as coachability and gender concordance. The study also found that mentor motivations play a significant role in founder selection, with intrinsic, prosocial, and extrinsic motivations impacting choices differently. The study challenges assumptions that only strong startups and founders receive mentor support and highlights the importance of considering mentor motivations to allocate this valuable resource efficiently.

In Chapter 4, motivated by the COVID-19 pandemic, I analyzed the impact of moving from an in-person accelerator to an online accelerator on peer entrepreneur networks. The expectation was that the online accelerator would have lower network connectivity and be more clustered due to the absence of proximity and disrupted interaction rituals. To test these hypotheses, I compared two consecutive cohorts of the same accelerator, one pre-COVID-19 (offline) and one during COVID-19 (online). Results showed that the online cohort's peer entrepreneur network became less connected and more clustered as the program progressed.

This was not the case in the offline cohort's peer network. Here, founders interacted with more peers and could reach a higher percentage of the cohort. These findings do not support the notion that digital technologies have the potential to amplify peer networking by removing constraints of physical location and lowering communication and coordination costs. Taken together, the findings suggest that peer networks between participating founders are an expression of how the design of an accelerator program gives opportunity to form and maintain social connections.

Finally, in Chapter 5, I focused on the relationship between founders' social networks and entrepreneurial passion in startup accelerators. Previous studies have shown that passion can spread (i.e., contagion) between founders and their employees, as well as between co-founders. However, these studies did not account for the dynamic nature of social connections, which could be influenced by both contagion and selection mechanisms (i.e., founders connect to others based on similar passion). In other words, if we observe two socially connected founders at any point in time with similar passion, both initial selection as well as subsequent contagion can explain this similarity. I found that both mechanisms play a role in explaining the similarity in passion. Selection explained 34% while contagion explained 57% of the observed similarity in the accelerator cohort. This study is the first to show that founders select social connections based on similarity for passion and implies that future studies on passion need to control for potential selection mechanisms.

Summary in Dutch

Het oprichten van een bedrijf is een veeleisend proces dat langere werktijden, intense tijdsdruk en hoge niveaus van complexiteit en onzekerheid met zich meebrengt, die veel groter zijn dan die waarmee werkende professionals worden geconfronteerd. Ondernemers moeten omgaan met uiteenlopende besluitvormingsproblemen, zoals het verfijnen van hun zakelijke idee, het ontwikkelen van een product of dienst, het aangaan en winnen van klanten, het beoordelen van concurrenten en het verwerven van de nodige middelen, zoals kapitaal. Om dit te doen, kunnen oprichters rekenen op de ondersteuning van mentoren, deskundige personen met oprichtings- of anderszins relevante ervaring en oprichters van andere startups die soortgelijke ervaringen hebben gehad.

Hoewel onderzoek heeft aangetoond dat zowel mentoren als peers kunnen bijdragen aan de ontwikkeling van oprichters en hun startups, blijft het onduidelijk hoe sociale verbindingen met mentoren en peers ontstaan en vervolgens oprichters beïnvloeden. Belangrijke vragen om te overwegen zijn onder meer hoe mentoren besluiten om sommige startup-oprichters te ondersteunen en anderen niet? Welke mechanismen stellen oprichters in staat om hun kansen op waardevolle mentor- en peer-ondersteuning te vergroten? En in hoeverre kunnen toegang tot mentoren en peers oprichters tot betere ondernemers maken? Deze vragen zijn vooral relevant gezien de potentiële waarde van ondernemerschap voor de samenleving en de aanzienlijke middelen die instellingen zoals startup-accelerators investeren in het bieden van toegang tot mentoren en peers. In mijn proefschrift neem ik deze vragen serieus en onderzoek ik startup-mentoring en peer-ondersteuning in één theoretische en drie empirische studies.

Als vertrekpunt richtte hoofdstuk 2 zich op het begrijpen van hoe startup mentoren en oprichters een relatie vormen en uiteindelijk ontwikkelen. Ik heb theoretisch onderbouwd dat mentoren zowel instrumentele (praktische ondersteuning bieden) als affectieve (emotionele

ondersteuning bieden) relaties kunnen vormen met oprichters. De traject van deze relatie hangt af van wederzijdse identificatie, succesvolle uitwisseling van middelen en de fase van de startup. De paper draagt bij aan onderzoek naar ondernemerschap als een sociaal ingebed fenomeen door de idiosyncratische aard van elke mentorrelatie te erkennen. De studie benadrukt verder het belang van een divers portfolio van mentoren, aangezien verschillende mentoren oprichters unieke waarde kunnen bieden, afhankelijk van hun voorkennis en ervaring. Tot slot stelt de studie vragen over de beste manier om mentoring binnen acceleratorprogramma's te organiseren om diepere relaties tussen mentoren en oprichters te ontwikkelen.

In Hoofdstuk 3 heb ik gebruikgemaakt van een conjoint-experiment om te onderzoeken welke eigenschappen mentoren zoeken in startup-oprichters en hoe hun motivaties van invloed zijn op hun keuzes. Mentorvoorkeuren zijn een belangrijke voorganger van de vorming van relaties en relevant omdat mentoren een belangrijke troef zijn voor oprichters die deelnemen aan ondernemerschapsprogramma's. Bovendien zijn mentoren een schaarse hulpbron in startup-ecosystemen. De resultaten toonden aan dat mentoren oprichters kiezen op basis van hun ervaring en externe erkenning van hun startup als markers van competentie, evenals op factoren van relatiekwaliteit zoals coachability en genderconcordantie. De studie toonde ook aan dat mentor-motivaties een belangrijke rol spelen bij de selectie van oprichters, waarbij intrinsieke, prosociale en extrinsieke motivaties de keuzes op verschillende manieren beïnvloeden. De studie daagt de veronderstelling uit dat alleen sterke startups en oprichters mentorondersteuning ontvangen en benadrukt het belang van het overwegen van mentor-motivaties om deze waardevolle hulpbron efficiënt toe te wijzen.

In Hoofdstuk 4 heb ik, gemotiveerd door de COVID-19 pandemie, de impact geanalyseerd van de overgang van een fysieke accelerator naar een online accelerator op

peer-ondernemersnetwerken. De verwachting was dat de online accelerator een lagere netwerkconnectiviteit zou hebben en meer geclusterd zou zijn vanwege het ontbreken van nabijheid en verstoord interactieritueel. Om deze hypothesen te testen, vergeleek ik twee opeenvolgende cohorten van dezelfde accelerator, één voor COVID-19 (offline) en één tijdens COVID-19 (online). De resultaten toonden aan dat het peer-ondernemersnetwerk van het online cohort minder verbonden werd en meer geclusterd werd naarmate het programma vorderde. Dit gold niet voor het peer-ondernemersnetwerk van het offline cohort. Hier interacteerden oprichters met meer peers en konden ze een hoger percentage van het cohort bereiken. Deze bevindingen ondersteunen niet de notie dat digitale technologieën het potentieel hebben om peer networking te versterken door beperkingen van fysieke locatie te verwijderen en communicatie- en coördinatiekosten te verlagen. Samengevat suggereren de bevindingen dat peer-netwerken tussen deelnemende oprichters een uitdrukking zijn van hoe het ontwerp van een accelerator programma de mogelijkheid biedt om sociale verbindingen te vormen en te onderhouden.

Tot slot heb ik in Hoofdstuk 5 gefocust op de relatie tussen het sociale netwerk van oprichters en ondernemerspassie in startup accelerators. Eerdere studies hebben aangetoond dat passie zich kan verspreiden (d.w.z. besmettelijk is) tussen oprichters en hun werknemers, evenals tussen mede-oprichters. Deze studies hielden echter geen rekening met de dynamische aard van sociale verbindingen, die beïnvloed kunnen worden door zowel besmetting als selectiemechanismen (d.w.z. oprichters verbinden zich met anderen op basis van vergelijkbare passie). Met andere woorden, als we op elk willekeurig moment twee sociaal verbonden oprichters observeren met vergelijkbare passie, kunnen zowel initiële selectie als daaropvolgende besmetting deze gelijkenis verklaren. Ik ontdekte dat beide mechanismen een rol spelen bij het verklaren van de gelijkenis in passie. Selectie verklaarde 34%, terwijl besmetting 57% van de waargenomen gelijkenis in de accelerator-cohort

verklaarde. Deze studie is de eerste die laat zien dat oprichters sociale verbindingen selecteren op basis van vergelijkbare passie en impliceert dat toekomstige studies naar passie rekening moeten houden met mogelijke selectiemechanismen.