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The Urgency of Intersectionality: A Review of Racialized Experiences in STEM Entrepreneurship

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Abstract

In the 1980s, businesses in the United States (U.S.) experienced an increased interest in entrepreneurship which created a significant growth in innovation through entrepreneurship education and programming. This growth influenced the creation of new federal policies (e.g., the Bayh–Dole Act) and federal government agencies' programming (e.g., SBIR, STTR and I-Corps) that sparked innovation to help drive the U.S. economy forward. Although there has been a significant push for entrepreneurship and innovation, there is still a lack of representation of racially minoritized populations (i.e., African Americans or Black people, Hispanics/Latinx, and Native Americans/Alaskan Natives) in entrepreneurship, innovation, and science technology, engineering, and math (STEM) fields. In 2012, the U.S. Small Business Administration (SBA) Office of Advocacy found that racially minoritized business owners accounted for only 22.9% of all U.S. business owners. This representation is even lower within STEM entrepreneurship (i.e., individuals in STEM disciplines who practice entrepreneurship or innovation as business owners or by starting a new venture). Previous research has focused on understanding and improving racial disparities and diversity gaps within STEM and within entrepreneurship that affect women, people of color, and low-income populations.

Here, we present a literature review that seeks to describe the current state of knowledge in examining the experiences of racially minoritized populations in STEM entrepreneurship and how they are studied with hopes to identify potential opportunities for research in the future and the use of intersectionality. During the 1990s, the term "intersectionality" emerged from critical legal scholarship to examine how systems of power (e.g., racism, sexism, classism, ableism) intersect to affect the social and political implications of individuals' lived experiences. Since then, intersectionality has become a critical approach to better understand and address the experiences and challenges of racially minoritized populations. The goal of this review is to summarize how the experiences of racially minoritized individuals in STEM entrepreneurship are studied and provide an overview of the frameworks used and study outcomes. First, we conducted a literature review search using Scopus and ProQuest to include literature on underrepresented populations' experiences in STEM entrepreneurship using a combination of the STEM, entrepreneurship, diversity, and experience search strings. Next, we explored the 772 results. We then applied all inclusion and exclusion criteria to this literature review search and removed all duplicates. This resulted in eight remaining articles that studied the experiences of racially minoritized populations in STEM entrepreneurship. However, none of these articles referenced intersectionality or used intersectionality as a framework to examine the experiences of racially minoritized populations. This resulted in many of the research findings' being limited and unable to address the unique barriers that racially minoritized populations confront in STEM entrepreneurship. Thus, we propose the use of Intersectionality Theory as a lens for examining STEM entrepreneurship will help to better understand the complex intersecting identities that shape social inequality and the experiences of marginalized groups in STEM entrepreneurship.

Keywords: intersectionality, STEM, entrepreneurship, and racially minoritized groups

Introduction

In the 1980s, interest in entrepreneurship and innovation experienced significant growth in the United States (U.S.) due to a push for a more innovative and entrepreneurial society motivated the U.S. government, private industries, and educational institutions to consider improving entrepreneurial support and education [2]. During this time, new policies and programming arose to not only spark innovation and drive the economy forward, but to ensure that the U.S. remained competitive in the global market [2], [3], [42]. Specifically, this growth influenced the creation of new federal policies (e.g., the Bayh–Dole Act) and governmental agency programming (e.g., the Small Business Innovation Research (SBIR) program, the Small Business Technology Transfer (STTR) program and the Innovation-Corps (I-Corps™) program. These initiatives aimed to assist with early-stage capital for technology commercialization, research and development (R&D), and educating academic researchers and students in entrepreneurship and innovation [3], [39], [42].

While there has been a significant push for entrepreneurship and innovation in Science, Technology, Engineering and Math (STEM), there is still a lack of representation of racially minoritized populations in STEM programs and entrepreneurship. According to the U.S. Department of Education's National Science & Mathematics Access to Retain Talent (SMART) Grant [51], STEM disciplines are physical, life, or computer sciences, mathematics, technology, engineering, and foreign language determined critical to national security. This differs from the National Science Foundation's (NSF) definition that broadly includes human, social, and earth sciences as STEM disciplines [29]. For this review, we define racially minoritized populations as individuals who identify as African American/Black, Hispanic/Latinx, and/or Native American/Alaskan Native. We define STEM entrepreneurs as individuals in STEM disciplines who practice entrepreneurship or innovation by owning a business or starting a new venture (i.e., people interested in new initiatives) [29], [40], [51].

Traditionally, most STEM degrees are awarded to non-Hispanic White or Asian male gendered populations [43]. In the United States, among the students enrolled in undergraduate STEM programs in 2018, only 18% represented racially minoritized populations [46]. Regarding entrepreneurship, the U.S. Small Business Administration (SBA) reported similar negative trends in 2012 with racially minoritized business owners only making up 22% of all U.S. business owners [34] despite reflecting 33% of the U.S. population [48]. These disparities look even more stark when examining the representation of racially minoritized or marginalized populations in STEM entrepreneurship [4], [5], [24]. These inequalities formed by unequal systems of power can be further examined through the lens of intersectionality [15].

Background

Systemic racism contributes to the lack of representation in STEM entrepreneurship. Both institutional and structural, systemic racism is embedded within the policies and common societal practices that result in privilege for or oppression of certain groups [6]. Systemic racism accounts for many of the disproportionate impacts on racially minoritized populations. Specifically for African Americans/Black people, the effects of systemic racism are illustrated in the history of slavery and subsequent Jim Crow laws that actively worked against the Black

community's entrepreneurial/business ownership efforts [47], [57]. The resulting inequalities can be seen in current statistics on wealth building, employment, homeownership, healthcare, policing/incarceration, education, and entrepreneurship [41]. For instance, Black people make up 13.4% of the population [48], but own 4.1% of the wealth in the U.S. [22] and make up 33% of the U.S. prison population [21]. These inequalities are created by unequal systems of power that oppress Black people and other racially minoritized populations in the U.S. hindering them from gaining social and economic mobility.

The U.S. is negatively affected by the lack of representation of racially minoritized populations in STEM entrepreneurship [24]. For Black entrepreneurs and businesses, systemic racism has played a role in creating loss of: wages; access to housing credit; access to higher education; and equitable lending [24], [41]. As a result of systemic racism, racially minoritized populations patent at a significantly lower rate than their white counterparts [35]. In addition, many racially minoritized entrepreneurs encounter many barriers to commercialization from access to STEM education, networking, institutional structures, innovation exposure and access to venture capital [24]. Disparities in the innovation, not only hinder economic growth, but also impacts the United States' leadership in innovation [24]. Past research has shown that lack of diversity hinders creativity, innovation, job creation and economic growth [13], [24], [26]. Moreover, Citi Global Perspectives & Solutions posits that failure to redress Black inequality and the racial gaps between Black and white people alone has cost the U.S. economy up to $16 trillion in the past 20 years in Gross Domestic Product (GDP), the U.S. total value of products and services produced annually [41]. Therefore, to ensure the U.S. remains globally competitive, there exists a need for research that explores the relationship between systemic racial inequities and the career trajectories of racially minoritized populations in STEM entrepreneurship. The purpose of this paper is to explore how the experiences of racially minoritized populations in STEM entrepreneurship are studied and to provide suggestions for how future research can use intersectional approaches.

Intersectionality

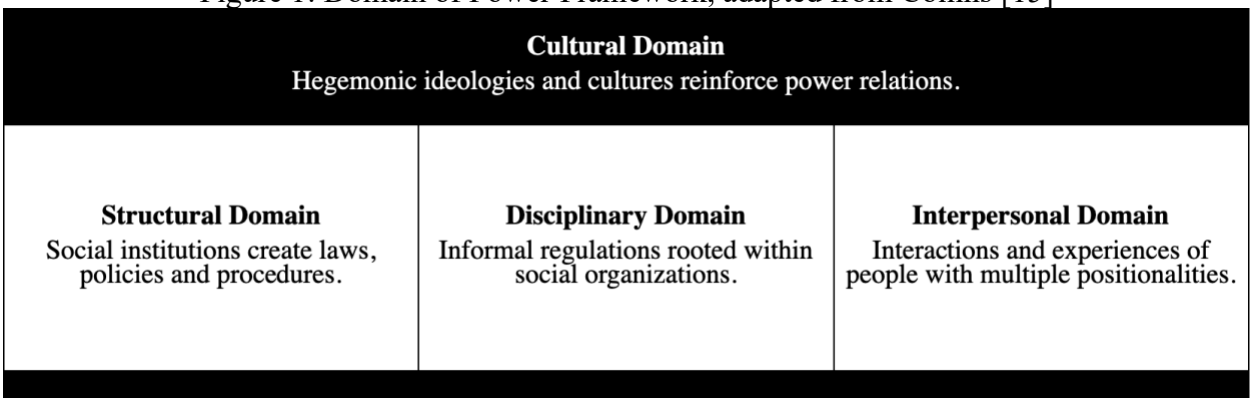
Intersectionality was developed by lawyer and critical race scholar Kimberlé Crenshaw [12] as a theoretical paradigm and praxis to illustrate ways that interdependent systems of oppression (e.g., racism, sexism, classism, ableism, etc.) intersect to affect the everyday lived experiences of individuals [15]. In a legal case involving General Motors, Crenshaw [18] argued that the court's single-sided analysis of race and gender failed to account for the discrimination Black women experienced being both Black and women. Crenshaw contended that the courts must view race and gender as socially constructed intersecting identities to address the specific needs and unique experiences of Black women. The term "intersectionality" was coined in 1991[12] and has become a term that is used in many fields of study ranging from gender, cultural, racial or ethnic studies, and other contexts [17]. While multiple definitions can be found in the literature, the definition from Collins and Bilge [17] is widely accepted, and states:

> Intersectionality is a way of understanding and analyzing the complexity in the world, in people, and in human experiences. The events and conditions of social and political life and the self can seldom be understood as shaped by one factor. They are generally shaped by many factors in diverse and mutually influencing ways. When it comes to social inequality, people's lives and the

> organization of power in a given society are better understood as being shaped not by a single axis of social division, be it race or gender or class, but many axes that work together and influence each other. Intersectionality as an analytical tool gives people better access to the complexity of the world and of themselves (p.2).

Intersectionality used as an analytical tool can help us to understand and analyze the complexity in human experiences and the organization of power by exploring how aspects of one's social and political identities intersect and overlap [17]. Moreover, it illustrates that the major axes of social divisions (e.g., race, gender, class, dis/ability, sexuality, age, etc.) are not mutually exclusive but build upon each other and contribute to peoples' lived experiences [17]. Power relations are a key concept in intersectionality. Specifically, Collins' [15] domain of power framework depicts how power is constructed through structural, disciplinary, cultural and interpersonal domains. The structural domain refers to ways social institutions create laws, policies and procedures that advantage and disadvantage some groups over others. The disciplinary domain depicts the informal regulations rooted within social organizations that hinder racially minoritized populations from attaining social mobility. The interpersonal domain emphasizes the shared interactions and experiences of people with multiple positionalities. Lastly, the cultural domain depicts the way hegemonic ideologies and cultures reinforce power relations in each of the other domains [15].

Figure 1: Domain of Power Framework, adapted from Collins [15]



Applications of intersectionality in STEM and entrepreneurship

Although there is a significant landscape of literature in STEM entrepreneurship that focuses on women, gender differences, entrepreneurial efficacy and entrepreneurial mindset, research on racially minoritized populations remains understudied. Most of the literature examining the experiences of racially minoritized populations in STEM entrepreneurship focuses on program design and evaluation for entrepreneurship and innovation programs that seek to support underrepresented students (e.g., racially minoritized populations, women, first generation, and low-income) in STEM [10], [11], [30], [38], [45], [53], [54]. As such, gaps in our understanding of power systems (i.e., structural, disciplinary, interpersonal, and cultural) that impact the experiences of racially minoritized populations in STEM entrepreneurship are still present.

Within the limited research that does exist, intersectionality has been used as a framework when examining the experiences of racially minoritized and underrepresented populations solely in

entrepreneurship. For example, Valdez [52] used intersectionality theory as a framework to investigate how the household economy (i.e., household composition & family ideology) forms intra-group differences among Mexican entrepreneurs. Valdez [52] aimed to explore the unequal access and distribution of resources between families of individuals who share the same race but differ in gender and class due to power relations. Their study found that intersectional dimensions of identity collectivity have an impact on entrepreneurial outcomes in ethnic households and that differences in class and gender within household's form access to family-based resources that provide access to entrepreneurship [52]. Additionally, Knight [32] used Dill and Zambrana's [19] intersectional/interlocking systems of oppression framework adapted from Collins [15] domain of power intersectional framework to examine the process of gendering, classing, and racialization (i.e., process of differentiation) for Black women from the Caribbean in entrepreneurship. Knight [32] discovered that many forms of oppression against Black women have influenced their entrepreneurial participation from unfair wages/tasks, primary childcare responsibilities, obtaining loans, access to mentors, to the perception of Black women in society. Ultimately, these studies suggest that to improve diversity, equity, and inclusion (DEI) in STEM entrepreneurship through education, policy, and access for minoritized populations, it is critical that intersectional approaches are used to explore their unique challenges and barriers.

To make a more effective impact on the economy, literature suggests that racial equity must be improved, not only in entrepreneurship and innovation, but specifically in STEM education and entrepreneurship [24]. Failure to attract racially minoritized groups in STEM further adds to the challenge of improving racial equity and diversity in the innovation economy. To promote DEI in STEM entrepreneurship for marginalized groups, the perceptions of their experiences, and barriers and needs in STEM entrepreneurship must be understood. Thus, this review postulates that studying the experiences of racially minoritized populations with complex intersecting social and political identities and beliefs which disadvantage some over others are best viewed through the lens of "intersectionality" [9], [12].

Purpose & Research Question

Although past research has been conducted integrating intersectionality theory into research in STEM disciplines and entrepreneurship respectfully, there is a gap in how experiences of racially minoritized populations in STEM entrepreneurship are studied. The goal of this study is to highlight the importance of using intersectionality to examine the experiences of racially minoritized populations in STEM entrepreneurship. We seek to explore the following question:

How are the experiences of racially minoritized populations in STEM entrepreneurship studied?

In the following sections, we summarize how racially minoritized experiences in STEM entrepreneurship are studied, provide an overview of the frameworks being in literature along with research study outcomes, and address the need to use an intersectional lens when exploring the experiences of racially minoritized populations.

Methods

This review uses a combination of pre-established methods. We used a method adapted from Ferrari [23] which focuses on conducting narrative style reviews. Also, we used Borrego's [7], [8] methodology for conducting a systematic literature review in engineering education in six steps: (1) deciding to conduct a systematic literature review, (2) identifying the scope and research question(s), (3) defining inclusion criteria, (4) finding and cataloging sources, (5) critiquing and (6) synthesizing the literature. Ferrari [23] provides guidance on conducting narrative style literature reviews, while integrating systematic review methods. This approach uses additional established guidelines to improve the quality of a narrative review because unlike systematic reviews that utilize Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, narrative reviews have no acknowledged guidelines [23] which creates limitations of not being reproducible and unknown selection and evaluation bias. The objective for creating more thorough guidelines aimed to improve narrative reviews while keeping the overarching goal of a literature review the same which is to identify and summarize published literature to further explore future research possibilities in the field remains the same [23].

This review seeks to describe the current state of knowledge in examining the experiences of racially minoritized populations in STEM entrepreneurship and how they are studied with hopes to identify potential opportunities for research in the future. According to Borrego [8], there are three types of inclusion criteria that should be applied once the purpose, research questions and scope are identified. These criteria include selecting databases for this search, determining the combination of search words and logical connectors, and selecting the articles to be analyzed [8]. Scopus and ProQuest (which includes ERIC) were the two databases used in this review. These databases were selected due to their wide range of literature ranging from STEM, education and business. The literature review search was conducted on July 8th, 2020 through Scopus and ProQuest to include literature on underrepresented populations experiences in STEM entrepreneurship using a combination of the STEM, entrepreneurship, diversity, and experience search strings, shown in appendix. These search strings were created to yield a small enough subset of literature that additional inclusion and exclusion criteria can be applied to.

The literature search identified 772 results highlighted in Figure 1 that were further screened based on the establishment of more detailed inclusion and exclusion criteria, shown in Table 2. Each article's title and abstract were carefully reviewed to find studies pertaining to the experiences of racially minoritized populations in STEM entrepreneurship. For exclusion criteria, all results were limited to peer-reviewed journals published in English if they fit all other requirements and studied underrepresented populations' experiences or perceptions in STEM entrepreneurship. There was no time period specified in the exclusion criteria due to the limited amount of literature published in STEM entrepreneurship so all research regardless of the publication date was considered. Once all inclusion and exclusion criteria were applied to this literature review search and all duplicates were removed there were eight articles remaining to be further explored that studied the experiences of racially minoritized populations in STEM entrepreneurship. The next steps included critiquing and synthesizing each of the final articles by summarizing the purpose, study design and outcomes using a review matrix adapted from Garrard [27]. The adapted matrix included the following information about each of the articles:

citation information, research questions/purpose, framework information, research methods and key outcomes. This helped to organize each of the studies to critique within and across each of the studies [8].

Figure 2: Search FlowChart, adapted from PRISMA [36]

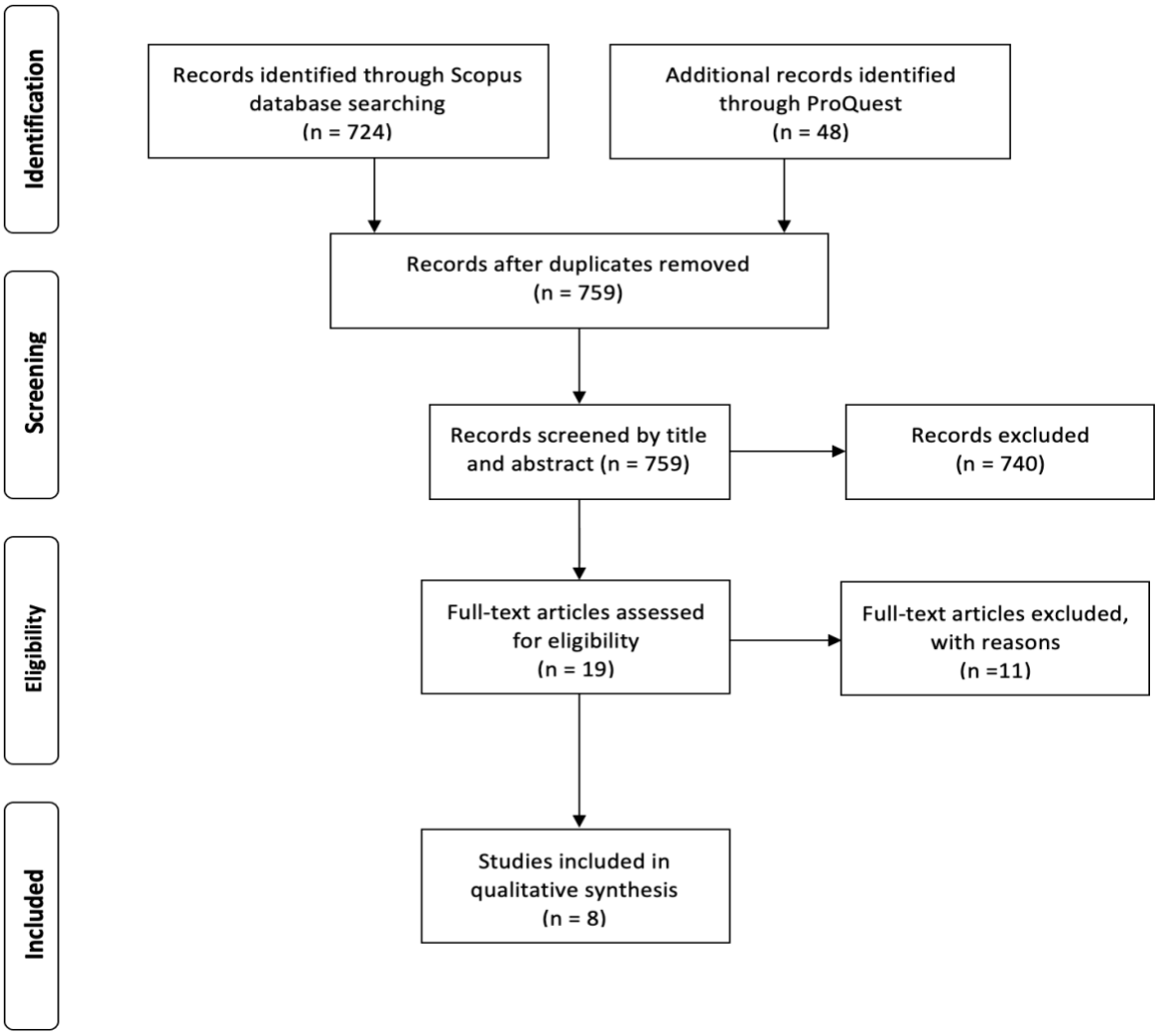


Table 2: Literature Review Inclusion & Exclusion Criteria

Inclusion Criteria	**Exclusion Criteria**
Literature in English	Literature reviews
Journals and conference proceedings	Book reviews
Study participants must be in or have an interest in STEM (using SMART grant STEM definition)	Studies that do not consider experiences or perceptions of racially minoritized populations
Sample population included racially minoritized populations	Studies that only focus on entrepreneurship and do not include STEM
Final press available	Studies solely focused on gender (i.e., women)

Results

Overall, we identified eight articles that met our criteria. The larger landscape of literature in STEM entrepreneurship focuses on women, gender differences, entrepreneurial efficacy, and entrepreneurial mindset. A smaller subset of literature focused on racially minoritized populations in this area has recently emerged with the first paper appearing in 2017 and half of the articles (n=4) being published recently in 2020. This provides evidence that racial equity and diversity in STEM entrepreneurship is a newly emergent research area which aids in validating the limited number of articles uncovered during this review. Table 3, adapted from Garrard [27], provides a highlight and summary of the eight articles focused on the experiences and perceptions of racially minoritized populations in STEM entrepreneurship. Seven of the articles focused on examining STEM and entrepreneurship programs that support racially minoritized populations. The next section will provide an overview of those programs along with the outcomes of the studies.

Overview of Programs and Interventions

Seven of the eight papers focused on program design and evaluation for entrepreneurship and innovation programs that seek to support racially minoritized and underrepresented students (e.g., women, minorities, first generation, and low-income populations) in STEM. The programs referenced in the literature included: The Invention Bootcamp, Career Advancement Mentoring Program for Young Entrepreneurs (CAMP-YES), Poder (i.e., Spanish for "to be able to" and "power"), Pathways to Innovation, #WatchMeCode and STEM-Inc. We discuss these programs and interventions in the following paragraphs.

The Invention Boot Camp

The Invention Boot Camp is a four-week interdisciplinary program that focuses on teaching entrepreneurship, innovation, and STEM skills in a college environment to underrepresented high school students in STEM [38]. One benefit of this program is that it utilizes an equitable lens in the recruitment and application process by going into schools with a large percentage of racially minoritized and low-income students and bases its application on non-cognitive variables (e.g., student grades not required for admission). Mentoring is a key component of the Invention Boot Camp and students were provided with academic, technical, and emotional support. Through focus group interviews and a collection of student and mentor surveys this study found that the program positively increased students' attitudes toward innovation and entrepreneurship as well as self-confidence and increased sense of belonging.

CAMP-YES

CAMP-YES, an NSF funded program seeks to prepare talented need-based STEM students in the transition to the workforce, graduate school, or entrepreneurial startup industry [53]. Students are given the opportunity to select one of three career preparation paths in research, entrepreneurship, or an industry internship and are provided mentors, academic services, and group development activities. This study used identity, self-esteem, and academic motivation scales to find that cultural identity may promote or hinder undergraduate students in their participation and progression in STEM disciplines. For this study, cultural identity was defined as the "reflection of identities in relation to gender, ethnic, and first-generation college status" [53].

Poder
Poder is a culturally responsive entrepreneurship training and career/college preparation program offered as a five-week educational intervention program to underrepresented community college students [10, [11]. This program seeks to address the underrepresentation of racially minoritized populations in STEM and the systemic barriers that hinder their educational and career success through an education program developed from the foundations of Social Cognitive Career Theory and Critical Consciousness. This two-part study found that: (1) culturally responsive program curriculum aids in career development for underrepresented students [10], and (2) students had an increased awareness of how social constructed identities (i.e., race/ ethnicity, gender, class, ability/disability, etc.) impacted their career development through privilege and oppression [11].

Pathways to Innovation
Pathways to Innovation, an NSF funded program, seeks to aid and fund institutions in incorporating innovation and entrepreneurship into university courses [20]. Howard University, a historically black college and university (HBCU) in the Washington D.C. area, applied to this program and used many of the outcomes to create an innovation ecosystem [45].

#WatchMeCode
#WatchMeCode is a program that supports Black boys in high school interests in computer science (CS) through offering a technology and entrepreneurship program [54]. This study found that engaging students in CS utilizing Design Thinking improved participants' perception of CS and increased their confidence and interests to major in CS disciplines.

STEM-Inc
The last program, STEM-Inc, is provided to middle school students as an introduction to entrepreneurship practices to improve student interests towards STEM. All the programs catered to racially minoritized populations while engaging them in STEM, entrepreneurship, and innovation [30]. This study found that introducing racially minoritized students to entrepreneurship at formative ages during the development of their career interests and motivation can help to retain and increase students' interests toward STEM.

Research Design
A review of theoretical foundations for each paper revealed that four of the articles did not reference or use a framework in the study's research design. Although two of the research studies referenced intersecting identities, one specifically mentions intersectionality. Seven of the eight papers in this review made no reference to intersectionality or used intersectionality as a framework. Only three of the articles solely utilized quantitative research methods to evaluate and measure the outcomes of the entrepreneurial programs. Three of the studies utilized mixed methods research methods, one study utilized qualitative research methods and one study was a case study. Although qualitative data was collected in half of the studies, only two articles provided detailed accounts of participants' responses in the research paper. Lastly, all the literature except the one case study examined racially minoritized populations in STEM entrepreneurship through an educational viewpoint ranging from 6-12th grade to undergraduate education.

Table 3: Articles that Study URM Experiences in STEM Entrepreneurship

Author (year)	Program/Focus	Purpose	Subjects	Frameworks	Methods	Findings/Outcomes
Neve & Keith-Marsoun (2017)	Invention Bootcamp	Provide an overview of the programs and outcomes	Underrepresented high school students in STEM (i.e., women, low income, and racially minoritized students)	None	Mixed methods (focus group and surveys)	Students had an increased interest toward invention and entrepreneurship and developed a higher sense of belonging throughout the program.
Villalobos, Nair, Massi & Straney (2019)	Career Advancement Mentoring Program for Young Entrepreneurs (CAMP-YES)	Explore if race and gender identities influence STEM commitment, self-esteem and academic motivation	Underrepresented undergraduate students	None	Quantitative	More than half of the participants felt confident in their abilities; Hispanic and Black students had higher levels of social identity compared to White and Asian students; and female students had higher academic motivation than male students.
Cadenas, Cantú, Spence & Ruth (2020)	Poder	Program outcomes in entrepreneurship educational and career pathways	Underrepresented community college students	Social Cognitive Career Theory* & Critical Consciousness*	Qualitative	Most students displayed more awareness of both privileges and barriers related to their identities (i.e., race/ ethnicity, gender, class, ability/disability, etc.) and how they impact their career development.
Cadenas, Cantú, Lynn, Spence & Ruth (2020)	Poder	Evaluate program effectiveness in entrepreneurial self- efficacy	Underrepresented community college students	Social Cognitive Career Theory*, Critical Consciousness*, Entrepreneurial Self-Efficacy	Quantitative	A program designed with a curriculum that is culturally responsive does promote career development and entrepreneurial self-efficacy of underrepresented students.

Author (year)	Program/Focus	Purpose	Subjects	Frameworks	Methods	Findings/Outcomes
Smith, Warner & Burge (2020)	Lean Launchpad (Pathways to Innovation)	Ecosystem overview	Undergraduate HBCU Students	None	Quantitative	An innovation ecosystem with a network of resources to support underrepresented groups in innovation and entrepreneurship may start to improve representation in high-tech industries.
Washington, Mejias, & Burge (2019)	#WatchMeCode	Program overview & outcomes	Black high school boys	Design Thinking*	Mixed Methods	Engaging curriculum can improve the perception of CS, increase confidence and interests to major in CS among black boy high school students.
Williams, Ammetller, Rodríguez-Ardura & Li (2020)	Identity Negotiation	Examine intersecting discourses of gender, entrepreneurship, and culture	Female tech entrepreneurs from different cultures	Entrepreneurial Identity**, Social Constructionism*, Bem's Sex Role Inventory** and Hofstede's Dimensions of Culture**	Case Study	No single "entrepreneurial identity" exists for female entrepreneurs because each participant negotiated discourses differently.
Huang, Kuscera, Jackson, Nair, & Cox-Petersen (2018)	STEM-Inc	Program design & outcomes	Middle school students	None	Mixed Methods	Entrepreneurship can be successful in retaining or increasing student interests toward STEM at formative ages during the development of career interests and motivation.

* Study grounded in theoretical foundations, ** Framework used to analyze data

Discussion

Inequality cannot be measured solely along one dimension of identity; hence this review posits that the experiences of racially minoritized populations in STEM entrepreneurship are best viewed through the lens of intersectionality. This review found that intersectionality was not referenced or applied to any of the studies we identified, which is a strong method for examining the everyday experiences of racially minoritized populations. Intersectionality can help to explore and adequately address the unique barriers, systems of inequality and unequal power domains that racially minoritized populations confront in STEM entrepreneurship.

Intersectionality & Power Domains

For instance, Cadenas et al. [10], [11] sought to specifically examine how participation in the Poder program shaped the experiences of racially minoritized populations in relation to entrepreneurial and career outcomes. Their study aimed to address the systemic barriers racially minoritized populations face, specifically as it relates to a lack of access to education and to discrimination in the workplace which further oppress marginalized communities. Poder was specifically catered to community college students because community colleges provide an environment beneficial to addressing the disparities in education, and moreover in STEM entrepreneurship. Next, we will propose suggestions for how intersectionality can be used to understand and address the experiences of racially minoritized populations.

Cadenas et al. [11] used Social Cognitive Career Theory and Critical Consciousness to structure the Poder program, a free, five-week program that integrates culturally responsive curriculum through social entrepreneurship (i.e., new ventures that benefit communities). Social Cognitive Career Theory explains career interests, choices, and performance in relation to self-efficacy and outcome expectations [33]; while Critical Consciousness represents the ability of marginalized groups to challenge and address social oppression [25]. The studies' outcomes found that most students displayed more awareness of both privileges and barriers related to their identities (i.e., race/ ethnicity, gender, class, ability/disability, etc.) after participating in Poder and how they impact their career development [11]. Cadenas et al. [11] findings focus on variations across different identity groups (e.g., race, gender, and immigration status) without focus on the structural inequities in place that are affecting these different groups.

We suggest that the integration of intersectionality in Cadenas et al. [11] research study design would further examine and challenge power. While this study has value in providing a connection between social change and entrepreneurship in marginalized communities, there is an additive value in research that "gives voice" to marginalized groups using critical race methodologies, more specifically Intersectionality Theory. It is critical to situate work that focuses on racially minoritized populations in frameworks that address systems of inequality and power relations. For instance, one of Cadenas et al. [11] main findings are that after participation in Poder, most students had an increased awareness of privileges and oppressors related to certain aspects of their identities. One student who was a 20-year-old biracial female noted that she has experienced hitting glass ceilings many times in her life [11]. Intersectionality would help to understand the context and setting of the barriers experienced and highlight if this is a shared experience for other racially minoritized women. Moreover, it would help to unveil how

interpersonal and disciplinary domains of power are organized and constructed in society, the workplace and educational systems which impact racially minoritized women with the goal to improve support and formal/informal policies and regulations.

Cadenas et al. [11] also found discrepancies between what participants were taught before the program and the information they learned on critical consciousness and social oppression while participating in the program. This program gave participants the opportunity to reflect on social inequalities through their own marginalized experiences and address these experiences countering dominant discourses and narratives as it relates to meritocracy and equality. Intersectionality as a framework can be used to explore power that lies within the cultural domain and how that spans across all the other domains of power (i.e., interpersonal, structural, and disciplinary). Participants' experiences are rooted in the historical social construction within the U.S. where ageism, geographical location, race/racism, gender, and religious identities are all overlapping shaping his experiences. Lastly, Cadenas et al. [11] found that social and political changes impact students' futures and entrepreneurial career plans/outcomes. One example is Alejandro a 25-year-old Latinx male who was a DREAMer (i.e., undocumented immigrant) and felt his future would be shaped off government/political decisions [11]. There are many U.S. laws and policies that impact this participant based on his immigration status that using the structural domain of power can help to explore, such as the additional requirements that must be met to attain citizenship for example.

The Intersection of Identities

Intersectionality as a framework can be used to explore what types of discrimination participants perceived to have faced and how it impacts their day-to-day experiences. One student who identified as a 35-year-old white male mentioned that he felt discriminated against. Although this participant is privileged as a white male, he may experience barriers related to other aspects of his identity (e.g., classism, ageism, etc.) such complexity can be uncovered using intersectionality as a lens and asking questions that merge the participants identities to understand his lived experiences. An example of an intersectional question would be "when you think about your experiences as a 35-year-old college student and white man what are some of your day-to-day challenges, if any?" [9], [31]. This allows the participant to think about his position as a nontraditional college student and white man converge daily to uncover privilege and barriers. These are just a few examples provided which seek to expand on what could have been explored using Intersectionality Theory to dismantle systems of inequality and structures that hinder racially minoritized populations from gaining social mobility.

Incorporating Intersectionality in Research

Although intersectionality may be helpful as a tool to understand the complexity in the social world and in human experiences there are many challenges confronted with incorporating intersectionality into research design and analyses. There are three critical concepts of intersectionality that must be met: 1) moving away from additive analysis that classifies individuals as more oppressed or privileged, 2) relationality (i.e., the construction of social categories such as race and gender in relation to each other), and (3) social constructionism which posits that categories of difference (e.g., race, gender, class, etc.) are socially constructed and given meaning through social interaction and institutions [1], [16], [28]. Although these three critical concepts are used to guide empirical research, they have no clear application

guidelines for researchers who wish to apply intersectionality to their studies [56]. To address these challenges, researchers have identified different types of intersectional research that include: 1) group-centered research that aims to address inequality by understanding the unique experiences of marginalized populations 2) process centered research that aims to understand the organization process and structure of inequality through comparative analysis of the intersections of socially constructed categories, and (3) systems-center research that views socially constructed categories embedded inequality and the organization of inequality systems [14].

Limitations

This review does not fully encompass all literature that is focused on the experiences of racially minoritized populations in solely STEM or entrepreneurship. The limitations of this study included the lack of literature in STEM entrepreneurship that focused on the experiences of racially minoritized populations. This review sought to explore how the experiences of racially minoritized populations in STEM entrepreneurship were explored, however the findings reveal that this population is significantly understudied in STEM entrepreneurship.

Future Work

The United States has invested billions of dollars in the last decade to support STEM education, innovation and a push toward diversity, equity, and inclusion (DEI) efforts that broaden participation in STEM and entrepreneurship for women and racially minoritized populations [44], [49]. Yet women and racially minoritized populations remain underrepresented in STEM disciplines and entrepreneurship [37], [50]. One reason may be that the unique experiences of racially minoritized populations in STEM and STEM entrepreneurship may be unknown and many of their unique challenges due to systems of inequality have not been adequately addressed. Future research should consist of a group-centered intersectional approach that examines the experiences of racially minoritized populations in STEM entrepreneurship. Moreover, because racially minoritized populations in STEM entrepreneurship is significantly understudied, their unique challenges and experiences need to be more prominent in scholarship to address inequalities. Future research should seek to explore the structural (i.e., institutional and societal) factors that impact the experiences of racially minoritized populations in STEM and STEM entrepreneurship and further hinder them from gaining social mobility by establishing best practices of applying intersectionality frameworks in STEM education.

Conclusion

There are many disparities that affect women, lower-income and racially minoritized populations. Together, these present challenges and barriers to commercialization, patented inventions, obtaining a degree, effective networking, and exposure and access to venture capital, which has a significant impact on the economic growth in the U.S. [24]. Citi Global Perspectives & Solutions found that just "providing fair and equitable lending to Black entrepreneurs might have resulted in the creation of an additional $13 trillion in business revenue over the last 20 years that could have been used for investments in labor, technology, capital equipment and structures. 6.1 million jobs might have been created per year" [41]. The disproportionate challenges racially minoritized populations confront in STEM entrepreneurship result from systemic oppression and power domains. The results of this review presented eight articles that studied the experiences of racially minoritized populations in STEM entrepreneurship. However,

none of these articles referenced intersectionality or used intersectionality as a framework to examine the experiences of racially minoritized populations. This resulted in many of the research findings being limited in their ability to dive deep into and address how systems of power and inequality create unique barriers that racially minoritized populations confront in STEM entrepreneurship. Future studies should examine the unique experiences of racially minoritized populations in STEM entrepreneurship through an intersectional lens to understand their everyday lived experiences that are influenced by systematic oppression and power. Thus, we propose that the integration of Intersectionality Theory into STEM entrepreneurship literature will help to better understand the complexity of intersecting identities that shape social inequality and the experiences of marginalized groups.

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Appendix

Table 3: Search Strings

Scopus Search Strings	ProQuest Search Strings
(((TITLE-ABS-KEY(stem) OR TITLE-ABS-KEY(science) OR TITLE-ABS-KEY(technolog*) OR TITLE-ABS-KEY(engineering) OR TITLE-ABS-KEY(math)))) AND (((TITLE-ABS KEY(entrepreneur*) OR TITLE-ABS-KEY(commercialization) OR TITLE-ABS-KEY(innovation) OR TITLE-ABS-KEY ("tech transfer") OR TITLE-ABS-KEY ("technology transfer") OR TITLE-ABS-KEY (venture)))) AND ((TITLE-ABS-KEY(diversity) OR TITLE-ABS-KEY(inclusion) OR TITLE-ABS-KEY(underrepresented) OR TITLE-ABS-KEY(race) OR TITLE-ABS-KEY(gender) OR TITLE-ABS-KEY(equity)))	((noft(stem) OR noft(science) OR noft(technolog*) OR noft(engineering) OR math) AND PEER(yes)) AND ((noft(entrepreneur*) OR noft(commercialization) OR noft(innovation) OR noft("tech transfer") OR noft("technology transfer") OR noft(venture)) AND PEER(yes)) AND ((noft(diversity) OR noft(inclusion) OR noft(innovation) OR noft(underrepresented) OR noft(gender) OR noft(equity)) AND PEER(yes))