ELEMENTS

THE UNDERGRADUATE RESEARCH JOURNAL OF BOSTON COLLEGE
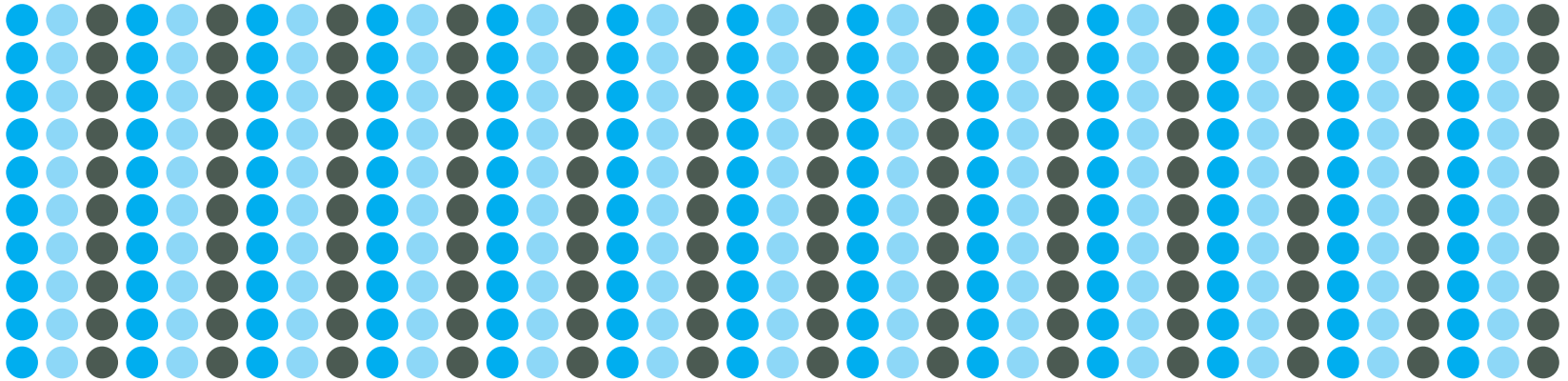
RAPTUS ET ROMAUNCE

DISCUSSING THE INCONGRUITIES OF CHAUCER AND FEMINISM

ALSO FEATURING

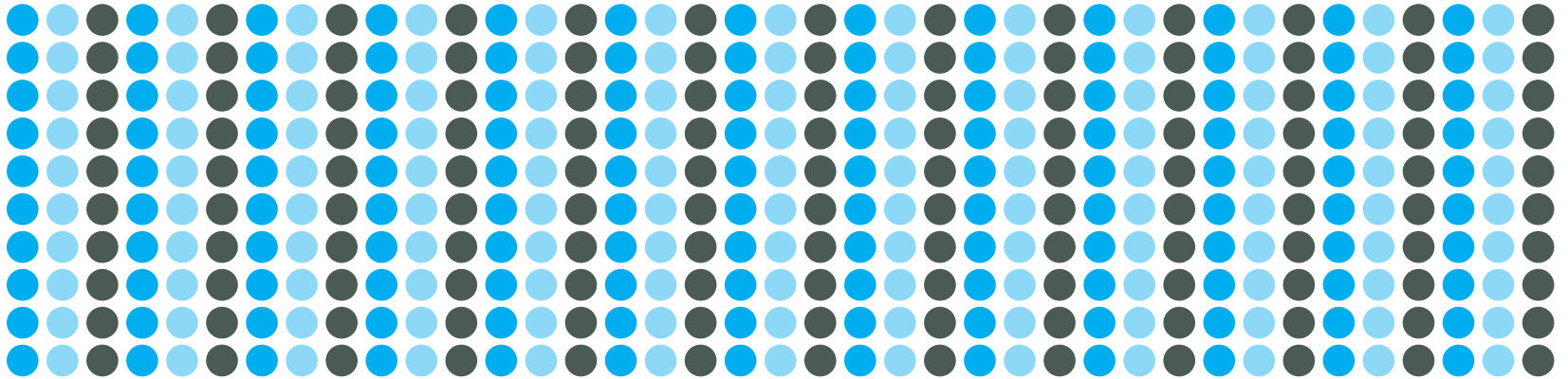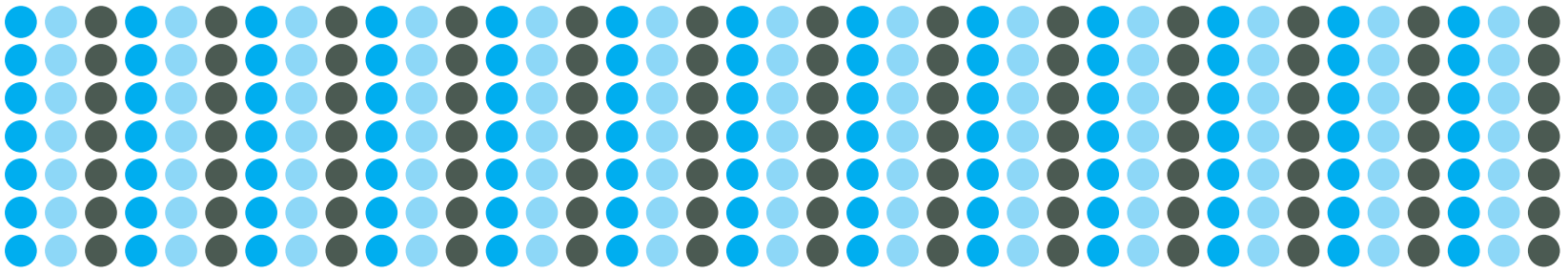- *Unmasking Medical Frauds*
- *Pronouns and Personhood*

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Elements, the undergraduate research journal of Boston College, showcases the varied research endeavors of fellow undergraduates to the greater academic community. By fostering intellectual curiosity and discussion, the journal strengthens and affirms the community of undergraduate students at Boston College.

Elements

Fall 2021

Dear Readers,

The Jesuit tradition and liberal arts education of Boston College is often lauded as one of the most versatile and effective ways to cultivate critical thinking, ethical reasoning, and intellectual dexterity—among a vast array of other skills so desirable to employers and the world in general. And yet, we are asked time and again the same question facing many undergraduate student research journals: "Beyond the educational benefit of practicing post-graduate work, where is the value in undergraduate research?" A perfectly valid response lies in the assertion that there is no well-defined chasm between inexperience and expertise that students leap across on the day of their graduation. Rather, each student undergoes a gradual accumulation of knowledge which can be competently utilized in real-world applications at any point throughout their college education, and this process, when taken in consort with fresh perspective, can yield incredible results. Taken further within the context of Element's environment, students exposed to the concept of cura personalis—literally "care for the whole person"—likewise have the capability to inquire intellectually, to search for the truth in all things, and to passionately use their knowledge in service to others. Indeed, the research present in this issue demonstrates the well-rounded intellect of its authors who, through careful analysis, offer enriched interpretations of—and in some cases potential solutions to—some of the most pertinent issues of our time.

In our cover article, "Raptus et Romaunce", Taylor Morales analyzes the incongruities of Geoffrey Chaucer and feminism from the personal and professional perspective. Morales will compare the dichotomous themes of two of Chaucer's works, while challenging the antifeminist representation of women in others. Our first feature article 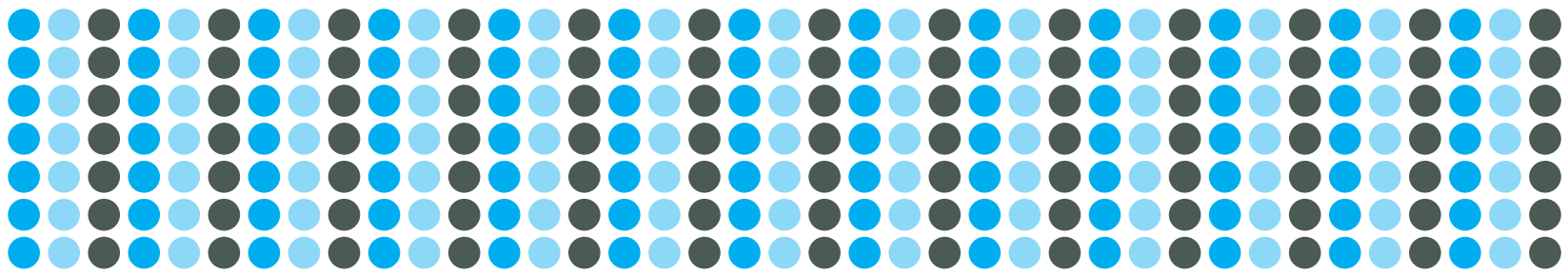"Pronouns and Personhood" by Chistine Lenahan examines the construction of gender identities from the feminist perspectives across multiple fields. Lenahan proposes a reevaluation of the problem of gender identity and the intersection of free will and biological determinism to fill in the gaps of understanding social construction, the self, and personhood. Nina Narayan's article "Unmasking Medical Frauds" delves into the complicated details and implications of illicit trade in the medical sector. Narayan discusses how the evolution of the ecommerce market in conjunction with the extensive reach of globalization has brought about new ways for illicit trade to circumvent regulation. In Maiya Whalen's article "Someone Like Me", she discusses how mentors can influence the sense of belonging for undergraduate students of color. Whalen emphasizes the crucial need for support of students of color when this relationship with belonging begins to impact their academic motivation and social acceptance. Katherine Garrett's article "Legalizing Love" explores how the state-level legalizations and national legalization of gay marriage affected the number of children adopted in the United States. And lastly Thomas Rostad's "Let The Sun Do The Work" examines the economic and environmental performance of residential PV-battery systems in Massachusetts across a plethora of points. Rostad explores how, when deployed at the residential level, PV-battery systems allow households to significantly reduce their reliance on the electric grid by storing excess electricity generated from their solar panels for self-consumption.

The range of perspectives and topics in this issue serve to highlight the vast and unique society that we live in. Whether it struggles to define the boundaries of ethical investment or create socioeconomic chasms in its summer learning loss, society has been challenged to think more about the issues deeply embedded and engrained in our system. These articles provide a well-written and well-crafted deep examination of these issues; an introspective challenge that requires us to understand the roles of aspects in our society that create these issues. This edition of Elements is a nod to those that want to illuminate and bring forth the difficult assumptions in our society; ones that through shared understanding can create constructive discourse.

Happy Reading!

Sincerely,
Michaela Balboni & Joanna Choe
Editors in Chief

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PRONOUNS AND PERSONHOOD

Exploring the Construction of Gender Identities from the Feminist Perspective

CHRISTINE LENAHAN

THIS PAPER ARGUES THAT TO HAVE GENDER IS NOT HAVING CERTAIN REPRODUCTIVE ANATOMY, BUT IS INSTEAD THE SOCIAL MEANING OF SEX. GENDER HAS NOW BECOME A SOCIAL CONSTRUCT IMPOSED UPON THE HUMAN PERSON, THWARTING THEIR ABILITY TO IDENTIFY AS THE SOCIAL GENDER THEY SUBSCRIBE TO. BECAUSE WE SEEK TO IDENTIFY AND ORGANIZE PERSONS INTO A SOCIO-SEXUAL HIERARCHY, THE GENDER REVOLUTION OF THE TWENTY-FIRST CENTURY, ESPECIALLY THROUGH THE IDENTIFICATION OF PERSONAL PRONOUNS, POSES A LARGER QUESTION, GREATER THAN ONE OF GENDER ORIENTATION. WHILE SOCIOLOGISTS ARE ADDRESSING THE RECENT EF- FECTS OF PERSONAL PRONOUN USAGE, THE PURPOSE OF THIS INQUIRY IS TO ACKNOWLEDGE THE LACK OF NEW RESEARCH MATERIAL IN PHILOSOPHY AND GENDER/QUEER THEORY, AN INTERDISCI- PLINARY FIELD THAT REQUIRES ATTENTION. I PROPOSE A REEVALUATION OF THE PROBLEMS OF GENDER IDENTITY ALONG WITH THE INTERSECTION OF FREE WILL AND BIOLOGICAL DETERMINISM AND TO FILL IN THE GAPS IN PREVIOUS THINKING SURROUNDING SOCIAL CONSTRUCTION, THE SELF, AND PERSONHOOD — ALL QUESTIONS PROMPTED BY THE GENDER REVOLUTION.

"What really matters, of course, about biological determinism is how it affects people, how it affects human beings. . .. If [the lives of individuals] are thwarted by a structure imposed from, without, or for social reasons falsely identified as lying within, they never get another chance. That's it. That's the greatest tragedy. That biological determinism is imposed upon billions of people." - Dr. Stephen Jay Gould

INTRODUCTION

Social structures constitute our world, serving as frames of meaning within which we, as social beings, act. Gender is among one of the largest impediments to just social structures in our world today.[1] Gender is systemically maintained in a culture because gender is performed in social roles and then is perpetuated by individuals who internalize society's response to those social roles. As a feminist, a student of philosophy, and a self-identifying woman, I am eager to investigate these structures and contribute to the growing conversation surrounding gender theory, gender fluidity, and social construction through my research.

I argue that to have gender is not to have certain reproductive anatomy, but instead, gender is the social meaning of sex. Because we seek to identify and organize persons into a socio-sexual hierarchy, the gender revolution of the twenty-first century, especially through the identification of personal pronouns, poses a question greater than one of gender orientation. While sociologists are addressing the recent effects of personal pronoun usage, the purpose of this inquiry is to acknowledge the lack of new research material in philosophy and gender/queer theory. I propose a reevaluation of the problems of gender identity and the exploration of the intersection of free will and biological determinism. Additionally, there is a need to fill in the gaps in previous thinking surrounding social construction, the self, and personhood.

I will be approaching this question from two primary research narratives. In the perspective of biological determinism, how free are we to choose our gender and thus pronouns that correspond to it? From a feminist philosophical understanding of sex and gender, how do we end gender oppression and force an upheaval of the conventional gender binary, which creates a power imbalance between biological males and females in society?

I will first investigate how pronouns play a part in the larger social constructs we exist in through the lens of social critical theory, working with texts by several prominent feminist philosophers. It is important to note that while much of my research will be theorizing, such theories are grounded in real world observation as well as the works of experts in the field of gender studies. My goal is to bring the ever-evolving gender culture of the twenty-first century into dialogue with the thought perspectives of sexologists, gender theorists, and social constructionists, ranging from works by the late philosopher Simone de Beauvoir to contemporary thinkers such as Dr. Sally Haslanger.

Second, I will investigate the usage of gender pronouns on campuses in the United States. College campuses are a microcosm of the fresh and adaptable minds, and first-year students are a growing resource for understanding gender theory and its social implications. I will be drawing upon surveys and interviews conducted among first-year students, noting how gender pronouns are used within college orientation programs.

The factors which make us mark and announce genders, like dress code, body hair, and even fragrance, constitute the inequality between and oppression of sexes; they are essential to the maintenance of that social system. If conversations about gender pronouns could be addressed in college campuses from first-year experiences, like orientation, it would create a foundation for a community that has a sense of gender orientation and normalizes identifying pronouns in everyday usage. Such normalization could lead to the end of gender oppression, the barriers that immobilize and mold those belonging to a particular biological sex and social gender groups.

Logically, the subordination and domination of respective gender groups presuppose that those groups may be easily identifiable by outward signals within society. One of those key identifiers is pronouns. If the usage of different pronouns in everyday culture was ubiquitous, there would be more recognition of gender fluidity, thus blurring the presupposed social boundaries between those groups and eliminating the appearance that humans are biologically sex-dimorphic. Increasing pronoun usage can be expected

IMAGE 1: PARTICIPANT AT THE ESPO LOGO WORKSHOP HOLDING A SIGN THAT DISPLAYS THEIR PRONOUN PREFERENCES.

Originally formulated to counter theories of biological determinism, the feminist distinction between sex and gender is not as direct as it may seem, despite the amount of scholarship on the subject since the mid-1900s. Feminism, which is the support for all genders and opposition to the patriarchy and sexism, calls for a distinction between sex and gender in aiming to end gender stratification. Sex, labeled as Male and Female, pertains to chromosomal, genetic, hormonal, and physical indicators.[2] Gender, however, pertains to how human beings express their personhood and how they identify within the social world. Gender is often separated into man and woman, otherwise known as the gender binary, but gender is not the causal result of biological sex and should not exist in a binary system as biological sexes do.[3] Within the gender revolution of the twenty-first century, there is a large draw towards the dismantling of the gender binary and the introduction of a wide variety of identities including Male, Female, transgender, gender-neutral, non-binary, agender, pangender, genderqueer, two-spirit, third gender, and all, none, or a combination of these.

Gender is the social meaning of sex—labels that we have created and systemically perpetuated within society. Thus, taken to the extent of its logistics, "if gender is the cultural meanings that a sexed body assumes, then gender cannot be said to follow from a sex in any one way" (Butler, 6). In fact, it is quite difficult to theorize about the relationship between sex and gender when we do not have a concrete idea of what a woman is or what a man is because "women" and "men" cannot be said to exist. Instead women and men are, in a sense, verbs. Social construction, the institutions and principles that govern society, claims that women and men are concrete beings and that they align with the biological sexes of Female and Male. This is wholly untrue and cannot be conceptualized since men and women exist in the abstract; they were construed as binaries by human beings in society. Instead, gender is a "performative" action. Such is the perspective of Judith Butler, a gender theorist whose 1990s work, *Gender Trouble*, provides key insight into the social construction of gender. For Butler, gender takes both a genealogical and philosophical approach; one that does not search for the origin or case of gender but rather one that searches for the effects of the

to improve existing injustices by recognizing human beings in their fullness when their correct pronouns are used. Yes, pronoun usage creates the possibility of misgendering, but it also fosters a space for correction and conversation without awkwardness. Our gender is learned and is not biologically determined, which should allow us to have the autonomy to identify our own gender identities that may not correspond with the biological sex. If we increase pronoun usage in our everyday social lives, through our free will, we give up the social pressure to "act" in a masculine or feminine way, erasing the gender binary. With the social threat of clear gender identity removed, we may move towards social justice among the sexes.

BETWEEN YOUR LEGS AND IN YOUR BRAIN: SEX VERSUS GENDER

societal institutions that construct the idea of gender and put it into practice.

Since the "performances" in question involve gesture, dress, movement, action, and language, it can be misinterpreted that gender as "performative" refers to a quasi-theatrical performance. This is not the case. According to Butler, "[Gender is] the stylized repetition of acts through time," (Butler, 78). In that phrasing, the "through time" portion is crucial because when an act is repeated through time, it becomes a part of the individual while maintaining a possibility of change. Gender is not a one act show; we don't perform masculinity or femininity and then cease gender expression. Instead, gender is *performative*, which implies that it persists through time, sometimes unintentionally, and has consequences outside of the self. Butler shies away from the idea of gender expression, which she understands to be an outward portrayal of an inward characteristic about our personhood. Instead, gender applies in the reverse format; it is established by others, usually from birth, and then shapes an individual's inward personhood over time.

Consider the idea of gender as being "performative" with this example of a common verb: to run. The phrase *I run* is logically valid because if I am propelling my legs through space in some direction, pumping my arms, and moving faster than walking pace, I would be considered to be running by an outside observer. Now if I were to propel my legs with less force and slow down my pace, I would be considered to be walking by an outside observer. The same argument applies to gender. The phrase *I am a woman* is logically valid because I am carrying out actions that society has deemed to be "of a woman" for whatever reason, such as having long hair, being gentle and petite, even down to my scent. Floral scents are largely considered feminine while musky scents are considered masculine. But, if I were to cut my hair short, start acting with a certain toughness or confidence and my actions appealed to society's definition of a man, the phrase I am a man would also be valid. In each case, whether I am acting as a man or acting as a woman, my gender is performed; it is not inherent to me as a person but it is done as an action, just like running or walking. Just as my heart size or lean mus-cle mass don't define me as a runner, my action of running does. My sex organs or hormone levels don't define my femininity or masculinity but rather my actions.

Ideas of gender can sometimes be contrary to a convention or logic. Society creates both discrete and overt principles of how a "man" and "woman" should act, dress, smell, and biologically and linguistically be identified before the subject can decide for themselves. Human beings that are regulated by these social constructs are thus formed, denied, and reproduced in accordance with the requirements of those constructs.

Thus, we reach the fault line of the gender binary. We assume that the titles of man and woman represent a common identity. Man and woman are not exhaustive terms; "if one is a woman, that is surely not all one is" (Butler, 3). In this way, the idea of gender identity is a misnomer, as identity is usually presumed to be a fixed idea. That is why I argue for the idea of personhood in accompaniment to gender identities, as gender identity falls under one aspect of personhood (personhood being a plural entirety). Furthermore, gender intersects with racial, class, ethnic, historical, and sexually-constructed identities; man and woman in the United States do not map onto man and woman in Vietnam.[4]

Feminism, which is typically defined as the movement toward equality among the sexes, is facing a larger problem. In the distinction between sex and gender, the Feminist perspective ought to strive for equality among the biological sexes and gender identities. The social structure of the gender binary remains ubiquitous in Western culture, but we can resist it by subversive acts. As Butler questions, "what would the acts of resistance be like, and what would we expect them to accomplish?" I offer gender pronouns as a partial solution and concrete act of resistance that finds its roots in historical movements that have influenced the twenty-first century. In the following section, I will discuss at length the linguistic representation of gender through the usage of gender pronouns.

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"If we are to recognize human beings in the fullness of their personhood, gender pronouns are one small yet pivotal step towards dismantling a binary that has oppressed genders for over a millennium."

IDENTIFYING GENDER BY PRONOUN USAGE

PGPs: Preferred Gender Pronouns

Pronouns are the most common gendered words in the English language. Pronouns, in a grammatical sense, are also known as function words. On their own, function words have very little meaning. In English, there are fewer than five hundred function words yet they account for more than half of the words we speak, hear, and read every day. Pronouns - such as I, you, he/she/they - different greatly from gender pronouns. Gender pronouns (sometimes called preferred gender pronouns) take the same form as functional pronouns (he/she/they) but denotes gender identity and personhood instead. This distinction is most often made on college campuses, where preferred gender pronouns are defined as:

"A consciously chosen set of pronouns that allow a person to accurately represent their gender identity in a way that is comfortable for them. For example, a trans person may begin using a gender-neutral pronoun prior to transitioning, and a gendered pronoun afterwards, or an agender, bigender or third-gender person may choose to use a neutral or invented pronoun."

The two youngest generations, Gen Z and Gen Y, are more likely than others to see gender roles and binary labels as outdated. According to a new study conducted by the advertising insights agency Bigeye, "half of members of Generation Z (or 50%) agree that traditional gender roles and binary gender labels [she/he pronouns] are outdated " (Bigeye 2021, 74). In their survey, Bigeye discovered that "one half of the respondents identifying as nonbinary indicated their personal pronouns are they/them/theirs." Personal pronouns do more than correctly refer to a person, they also validate that person's gender identity. According to Bigeye, "more than 12 percent of U.S. millennials identify as transgender or gender-non-conforming," and globally, "25 percent of Gen Z individuals expect to change their gender identity at least once during their lifetime." Human beings ought to be recognized in the fullness of their personhood if we are to achieve equality among all peoples. The simplest way to do so is by normalizing widespread gender pronoun usage. Within the transgender community there is a shift towards eliminating the use of the word "preferred" and simply calling them *gender pronouns* or just *pronouns*. This stems from a belief that including the word "preferred" implies that there is a desire of a wish to be seen as a specific gender rather than presenting who they truly are through authentic gender expression. It can be hurtful to assume that because something is preferred, it is not right or natural. The word "preferred" also implies that there is a choice for the speaker and user of certain gender pronouns. Transgender people strive to eliminate the idea of "choice" over their gender and instead strive to present gender as an authentic demonstration of personhood and using a person's gender pronouns is a form of mutual respect, solidarity, and understanding.

Moving Forward

In 2020, MasterCard's "TrueNameTM" campaign announced that trans customers could use their preferred name on credit cards, and United Airlines began offering passengers nonbinary booking options. Twelve states have introduced gender-neutral IDs and provide an "X" alternative to "M" and "F" on driver's licenses. Harvard's Faculty of Arts and Sciences' registration tool now allows students to register their preferred gender pronouns, including printing them alongside their names on student IDs. The importance of these policies is deeply personal: being able

to use their chosen names and gender markers sanctions transgender and nonbinary gender identities. Incorporation of gender pronouns ought to be ubiquitous: on name tags, in social media bios, in email signatures, on licenses and student IDs. The benefits of such identification are twofold. If a nonbinary person signs their email they/them in their signature, it is an immediate clarification for the type of pronoun that may be used. Additionally, although a cisgender person clarifying perferred cisgender pronouns (she/her, he/him) may seem futile, it may catch the attention of someone who is unfamiliar with gender pronouns, prompting a conversation.

Singular or Plural?
Grammar Mechanics of Gender Pronouns
In the previous section, I covered the historical conception of gender pronouns and the modern-day linguistic representation of gender pronouns - most commonly manifested in she/her/hers, he/him/his, and they/them/theirs. As our conceptions of gender evolve and adapt to the ever-changing definition of masculine, feminine, and non-binary, so do the grammar mechanics that apply to the gender pronouns. My inclusion of grammar mechanics is crucial in striving for the normalization of gender pronouns. It clarifies the grammatical rules that apply to them and will only further aid those confused by pronouns. As my father, a member of the baby-boomer generation, has recently questioned, "they/them... they *is* swimming or they are swimming?"

Dad, they are swimming, and here is why:

The Singular They
Among professional linguists and everyday English speakers, the syntactic representation of gender through the usage of a singular they has gained curiosity for decades. The English language lacks a gender-neutral singular pronoun to correspond neatly with "everyone" or "someone" and as a consequence, *they* has been used for this purpose for

over six hundred years. *They* is sometimes said to have the advantage of being already part of English grammar, in contrast to atypical alternatives[5] and is thus the most popular gender-neutral pronoun in use today. Let's take a look at some examples of the singular *they* in simple sentences.

(1) Grace and Anthony are swimming. They are swimming.
(2) Janet is swimming. They are swimming.

In example (1) *they* takes on its standard plural form, referring to two people swimming, while in example (2) *they* is being used for a specific, named individual in a particular context that calls for a non-binary pronoun. Since Janet prefers they/them pronouns, the speaker acknowledges and identifies them with the appropriate pronoun.

Even for innovative *they* users, the current status of *they* in English can meet its linguistic pitfalls, making syntax difficult depending upon the usage of *they*. For example, in the reflexive form:

"Janet presents *themself* as nonbinary. They presents *themself* as nonbinary."

NOT "Janet present *themselves* as nonbinary. They present *themselves* as nonbinary. "

Go ahead and read each sentence aloud, or better yet, type them out on your phone or computer and watch grammar suggestion tools grow furious as you ignore the syntax demands of a pronoun that must match its antecedent in gender and number. Here we see the difficulty in adapting to certain features of the English language and the singular *they*, wherein the antecedent doesn't have a particular gender. In the case of the reflexive form, we use *themself* and not *themselves* because Janet is not presenting many plural selves but rather one self that does not conform to a singular binary. Pronouns can be confusing and mistakes

"Correct your mistakes, ask questions, and normalize identifying your gender pronouns."

> *"Social construction looks at gender through a focal analysis that seeks to explain the phenomenon of men as dominant and women as subordinate in society as a pattern of social relations that has been performed and internalized and thus systemically maintained and deeply entrenched in our culture."*

can be made, but it is in the mistakes that we gain clarity about an individual's gender presentation. Misidentifying, a common error in nonbinary pronoun usage for someone who does not outwardly express one singular gender, should be met with compassion and conversation, not criticism and shame. Correct your mistakes, ask questions, and normalize identifying your gender pronouns.

THEY ARE WHO THEY ARE: GENDER AND SOCIAL CONSTRUCTION THEORY

Social Construction: Defined
"Our beliefs about the world create the reality of that world, as opposed to the position that the world reveals what is really there" (Kessler, 1998).

The multiplicity of uses and definitions of social construction has transformed its meaning over time and now in common vernacular, describes something as "socially constructed." This implies that it is illusionary or not fully real and, to a certain degree, such an impression holds true. The conservation surrounding social construction rests gently upon the surface of the larger philosophical debates of metaphysics and epistemology, which questions how we know what is real and what is not. In viewing gender through the social constructionist lens, the illusory nature of gender that is perpetuated by the usage of phrases like "gender is made up" or "gender doesn't exist" is dismantled. I argue that gender *does* exist but due to society's own conception and the meaning upon which we have ascribed it; gender does not exist naturally. Instead, because of social construction, gender has undergone the process of determining separate groups (gender binaries of man and woman) and naturalizing their subordination to one another. This is a process not only unique to the construction of gender but also to other constructs like race. Social construction looks at gender through a focal analysis that seeks to explain the phenomenon of men as dominant and women as subordinate in society as a pattern of social relations that has been performed, internalized, and thus systematically entrenched in our culture.

The norms by which an individual's personhood is evaluated must undergo ideological and institutional critique if we seek the eradication of the gender binary. "A critique of a concept is not a rejection of that concept but an exploration of its various meanings and limitations," through a conceptual and narrative framework that governs the way in which we socially construct ourselves (Anderson, 2001, p. 22). Following this line of thought, gender influences how individuals organize all of society and how they distribute power, thus making the elimination of gender socially impossible. It is here we see the formulation of gender stratification, which is the unequal distribution of wealth, power, and privilege across genders.

Patriarchal domination impedes equality among the genders, but conceptualizing gender oppression in terms of man-ness and woman-ness may also be misleading. it may foster false ideas and impressions based on the understanding that "man" is a single, ubiquitous, and unified category that necessarily subjugates the other single, ubiquitous, and unified category of "woman." Studies focusing on intra-gender inequality show that there exists numer-

ous forms of plural masculinities and femininities, which then affect the relations of domination not only between different genders but also within the same gender category. The greatest domination exists between what sociologists call hegemonic masculinity and emphasized femininities. These terms, as defined by social construction theorist Raewyn Connell in the late 1980s, refer to the forms of masculinity in a given historical and societal setting that legitimates unequal gender relations between men and women and within genders that then predispose the creation of stylized acts of femininity (Connell 1978, 19). Connell argued that hegemonic masculinity is always constructed in relation to subordinated femininities and other unconventional masculinities (Connell 1978, 21). Such terms allow an individual in society to understand the multifaceted dimensions of masculinity and femininity as well as the role of gender conventions in the structures of power and oppression that inadvertently and advertently govern the way in which individuals interact, particularly through their outward gender identification by means of personal pronouns. First, we must clearly define hegemonic masculinity and emphasized femininity.

Hegemonic Masculinities
"Initially formulated in the 1980s to shed light on a series of practices that promoted the favorable social condition of men over women, the concept of hegemonic masculinity is premised on the existence of a dominant form of masculinity. All men position themselves in relation to it, and therefore internalize personal codes of behavior that contribute to its reproduction."
(Mortennti, 1).

An Americanized concept of outward masculinity reads as such: a man is, most notably, heterosexual and manifests his man-ness in his personhood through the pronouns he/him/his. This man resists outward displays of vulnerability, weakness but instead should perform aggressive behaviors. He should "exhibit strength and toughness, and be competitive and successful" (Mortennti, 1). Therefore, men feel an immense social pressure to conform to the dominant ideas of being a man, which perpetuates gender-biased hierarchy in society. Those who do not, are typically subordinated and socially marginalized. As a result, the genders deemed effeminate or individuals in the LGBTQ-

IA+ community are subordinated while those who strive to conform to this ideal of man-ness are dominant and celebrated. Hegemonic masculinity then affects the political and economic spheres of society which perpetuate the inequality between and within genders. Consider women's right to vote, autonomy over the female reproductive organs, the wage gap, the pink tax, or the infamous glass ceiling that perpetually hangs in the ether of a universe socially constituted as cisgender, socially conforming men dominating other human beings. Because of the need to fill this socially-acceptable role, lack of life options and choices drastically reduces the degree of individual freedom in deciding the life an individual has reason to value, crushing their personhood.

Current cultural discourse surrounds inequality between the gender binaries, but there is a distinct lack of scholarship and advocacy for the social disparities between gender-non-conforming/gender fluid males who fall victim to the power structures of hegemonic masculinity, heteronormativity, and "manly men" in society. The long-term authority of hegemonic masculinity over social structures resides in its conception of man. Societal domination takes place not only between genders but also within them. Therefore, the problem is not man himself but the types of behavior and attitudes associated with dominance and power. These behaviors and attitudes are bolstered by society's continuation of sharply sex/gender-dimorphic categorizations. Normalizing various gender pronouns can begin to shift perspectives even in their simple, everyday isage by raising awareness to the fluidity of gener. Men face gender-related problems, just like women and such shared experiences have the potential to create bonds of mutual understanding and solidarity between men and women, increasing a social consciousness on gender perceptions.

Emphasized Femininities
Emphasized femininity is "the pattern of femininity which is given most cultural and ideological support . . . patterns such as sociability . . . compliance . . . [and] sexual receptivity [to men]"
(Connell 1987, 24).

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An Americanized concept of outward femininity believes a woman ought to be gentle and warm, but also a dependent and weak being who needs reassurance from men. Her sexuality is for men to capitalize on: sexual relations in her heterosexuality (i.e. sexual intercourse) and sexual spectacle in her homosexuality (i.e. pornography and fetishization). A woman manifests her femininity in outward displays of woman-ness not only through her gender normative pronouns she/her/hers but also in her dress, mannerisms, hair and makeup, scent, and, most notably, in her ability to bear children. From this limiting conception of women, emphasized femininity is practiced in a complementary, compliant, and accommodating subordinate relationship with hegemonic masculinity. Connell emphasized in her work that hegemonic masculinity has no meaning unless it is viewed in relation to its subordinated counterpart in emphasized femininity (Connell 1978, 21). And vice versa: femininity as a term, can barely be understood on its own if not for the opposing relationship to masculinity. Femininities are constructed in and through male bodies (what is commonly referred to as the "male gaze" in pop culture) and are emphasized through the repetition of stylized acts that foster and maintain a heteronormative, sex-dimorphic image of woman-ness. This, in turn, discursively emphasizes men in holding dominate roles, particularly in sexual relations within which the woman is deemed sexually compliant to the man. Femininity in this case is practiced and performed as Butler, being described in my earlier chapter, suggests (Butler, 3). Femininity is complementary to masculinity and the two work in a pseudo-social-symbiotic relationship: the "man" maintains his dominance, the "woman" maintains her subordination.

A functionalist approach to such inequalities holds that the disparities in sociological relations to power structures and larger social institutions are a result of each gender adapting to the roles they are best suited for: women in childbirth and maintaining the home while men are tied to labor and primary financial support. In third wave feminist understanding, emphasized femininity can only be conceptualized by the intersectionality of being a Female and the standard of the "woman identity" existing in society. Social norms are further propagated into a unique form of social separation, known as "othering." Here, "othering" refers to the discrete social competition among women in attempting to best orient themselves to an unattainable standard of femininity, thus isolating those who do not seek to conform to such a standard. Not only do women face subjugation to men but are isolated from other women in competition for femininity, which exists only as a complimentary social factor to men.This furthers women's subjugation, essentially annexing the woman from her personhood out of need for social survival.

CONCLUDING REMARKS

Gender is an entirely disjunctive class and a recent trend in feminist theory is to turn away from gender as a social classification on the whole. Gender is inherently unclear and complicated, so I don't believe there to be an answer to the social construction of gender. And yet I do not think gender needs to be removed from the conversation about social construction. In fact, gender is a primary example of the effects of social construction; our conversations should be directed towards it. Within this debate about the inclusion or removal of gender and social construction theory, it can be hard to tell what gender is, or, if it is anything at all. Context-sensitive gender distinctions, like in a position of social relations wherein the relations of domination constitute the categories of man and woman, depend upon the deepening discourse on gender theory. The aim of my work on the ubiquity of gender pronouns do just that. Gender theory, in the feminized social constructionists view is not a search for a distinctive truth but collects a plethora of truth from multiple perspectives to build a framework for contextual theorizing like for gender how social forces, under the guise of biological forces work to perpetuate inequalities. If we are to capture what is morally significant about the human being in society, we must continue to foster debates on gender in social constitution and incorporate the normalization of gender pronouns, which are a direct outward reflection of an individual's personhood corresponding to their gender or lack thereof.

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ENDNOTES

1. In this thesis, 'sex' denotes human females and males depending on biological features (chromosomes, sex organs, hormones and other physical features); 'gender' denotes women and men depending on social factors (social role, position, behavior or identity). The primary feminist motivation for making this distinction is to counter biological determinism. This theory is explained further in Section 2.

2. In the remainder of this paper, I will be denoting the biological sexes of Male and Female with capital letters in order to preserve their scientific definitions.

3. Or appear to do. Sexes are not always binary in their biological morphology as seen in Section 8.

4. Vietnam is a widely used example of a historically matriarchal society.

5. Some, but not all, neopronouns include per/per/pers, ve/ver/vis, xe/xem/xyr, ze/zie/hir/hirs
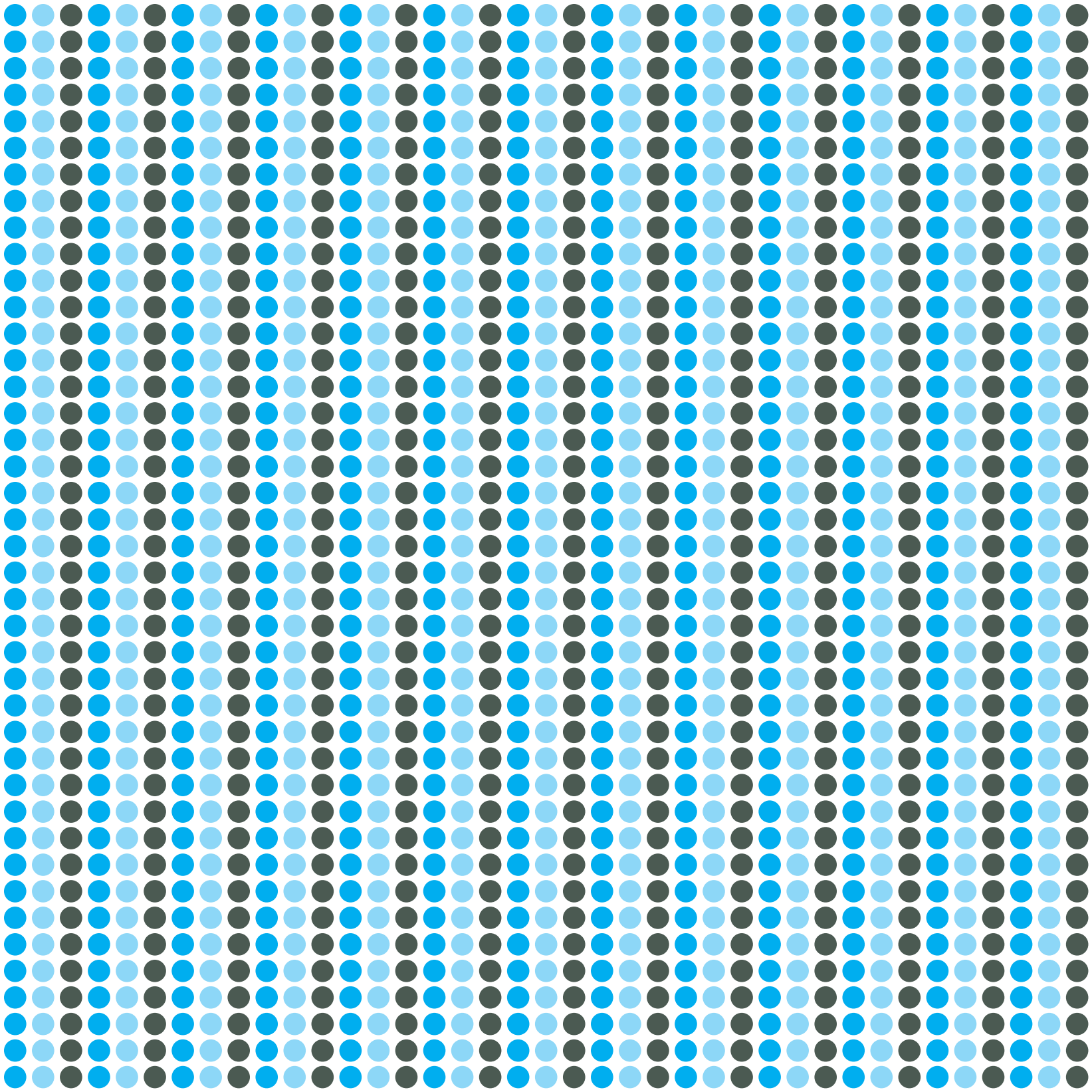
UNMASKING MEDICAL FRAUDS

Exposing the Details and Implications of Illicit Trade in the Medical Sector

NINA NARAYAN

THIS PAPER INVESTIGATES HOW THE EVOLUTION OF THE E-COMMERCE MARKET IN CONJUNCTION WITH THE EXTENSIVE REACH OF GLOBALIZATION HAS BROUGHT ABOUT NEW WAYS FOR ILLICIT TRADE TO CIRCUMVENT REGULATION, ESPECIALLY IN THE MULTIBILLION DOLLAR INDUSTRY THAT IS THE INTERNATIONAL TRADE OF COUNTERFEIT PHARMACEUTICAL PRODUCTS. DEVELOPING COUNTRIES ARE OFTEN ESPECIALLY VULNERABLE TO THE INCREASINGLY SOPHISTICATED METHODS FOR CIRCULATING FALSELY ADVERTISED MEDICINES, MEDICAL EQUIPMENT, AND HEALTHCARE AC-CESSORIES DUE TO UNSTABLE POLITICAL ENVIRONMENTS AND LOCAL GOVERNANCE. THE EFFECTS OF THE CONSUMPTION OF FALSE MEDICAL PRODUCTS CALL FOR ACTION IN REGARD TO REGULA-TION AND PREVENTION VIA LEGISLATION AND TECHNOLOGICAL ADVANCES. ECONOMIC IMPLICA-TIONS AS WELL AS THE NUMEROUS DANGERS POSED TO CONSUMERS WORLDWIDE MAKE ILLICIT TRADE IN THE MEDICAL SECTOR A PRESSING CONCERN, ESPECIALLY IN THE FACE OF GLOBAL HEALTH EMERGENCIES LIKE THE CURRENT PANDEMIC.

The trade of counterfeit drugs makes up a large portion of the global market in illegal goods, empowered and perpetuated by the growing and easily accessible e-commerce market. According to the OECD/EUIPO (2019) study, the value of global trade in counterfeit pharmaceuticals was up to USD 4.4 billion in 2016. Investigating globalization in the context of the healthcare sector and the implications of the international counterfeit healthcare trade demonstrates the immensity of the impact illicit trade has on both communities and local economies around the globe. Data from Interpol has shown that as of 2020, trafficking of falsified health products is ten to twenty times more profitable than heroin trafficking, emphasizing the magnitude of the dangers of this sector of illicit trade (Sanofi, 2021). The World Health Organization (WHO) has proposed that counterfeit medicine (branded or generic products) can be defined as one that is deliberately and fraudulently mislabeled with respect to identity and/or source, which has obvious potential for endangering unsuspecting consumers. A reiterated version of Matthew Sparke's definition of globalization describes it as "the extension, acceleration, and intensification of consequential worldwide interconnections" (Glass, 2014). When considered in the context of illicit trade in the healthcare sector, this quote emphasizes the consequential nature of these processes for everyone involved in the supply chain, from manufacturers in faraway countries to patients and consumers on the ground. Illicit trade in the healthcare sector, greatly enabled by the ever-expanding reach of the e-commerce market, significantly impacts the global economy and well-being of people across the globe. The counterfeit trade of medicines, medical devices, non-drug accessories, and personal protective equipment (PPE) creates safety and legitimacy concerns as they endanger those who fall victim to falsely advertised products, making technologies and policies that assist in curbing counterfeit trade increasingly crucial in the context of today's global value chains and worldwide challenges in healthcare.

COUNTERFEIT TRADE OF DRUGS & MEDICINE
Access to healthcare and treatment options is limited for many communities, especially in developing countries, sustaining and further increasing the demand for accessible medication and, consequently, for counterfeit medicine and prescription drug suppliers. According to the WHO, "counterfeit medicines potentially make up more than 50% of the global drug market" with a significant presence of these goods circulating in developing countries due to a lack of adequate regulatory

mechanisms and enforcement measures and the increasing sophistication of drug counterfeiters. The ripple effect of this trade sector impacts consumer confidence in healthcare and supply chains and undermines the efforts of legitimate pharmaceutical providers. According to Staake et al., counterfeiters can be classified into five groups: 1) disaggregators; 2) imitators; 3) fraudsters; 4) desperados; and 5) smugglers, labels that assist in developing a more organized approach to the issue of counterfeiting in the healthcare market. The Desperados Group represents products with medium to high visual quality, while the functional quality and product complexity is low. Consequently, they are said to pose a severe threat to consumers (Glass, 2014).

Counterfeit products lack active pharmaceutical ingredients (APIs) or include incorrect ingredients which may or may not be toxic and have impurities and/or contain incorrect quantities of these APIs, which are usually less than the stated amount. The United States Food and Drug Administration (FDA) has reported counterfeit and substandard medicines in both developed and developing countries, with 25% of these medicines being consumed in developing regions, such as Latin America, Southeast Asia, or Sub-Saharan Africa (Glass, 2014). The detrimental effects the magnitude of this problem has on the health of developing-world consumers make the efficacy of regulatory measures that much more crucial.

COUNTERFEIT TRADE OF PPE, MEDICAL DEVICES, & OTHER NON-DRUG ACCESSORIES
Illegitimate PPE, medical devices, and other non-drug accessories comprise a large sector of the products involved in the overwhelmingly large scope of the trade circulation of counterfeit healthcare-related goods and are less likely to be intercepted before reaching consumers compared to prescription drugs. This is due to non-drug products often having misleadingly accurate and convincing appearances and basic functionality. There is less data on the extent of the production and circulation of counterfeit medical devices because, according to the National Institute for Public Health and the Environment (RIVM). At the same time, the distribution of prescription drugs is legally restricted to pharmacies and drugstores, the legitimate supply chain for medical devices is broader and includes various other suppliers like supermarkets, department stores, and even public vending machines (De Bruijin et al., 2009). There have been significant differences in the medical device regulatory procedures of the developed

nations of the United States, the European Union (EU), and Japan. These have prompted the efforts and attention of the Transatlantic Trade and Investment Partnership (TTIP) towards its goal of fostering "enhanced compatibility of regulations and standards" (Lee-Makiyama et al., 2021). Market integration among the developed countries of the EU along with Japan and the US comprise almost 90% of global production and consumption of medical devices. Integration would not only ensure a greater level of economic stability but also eliminate several loopholes caused by regulatory discrepancies that allow for a large amount of the trade of counterfeit medical devices (Lee-Makiyama et al., 2021).

SAFETY & LEGITIMACY CONCERNS & THE SOCIETAL IMPACT

The consequences of the growing counterfeit healthcare trade involve pressing safety concerns for those in need and the detrimental effects of circulating illegitimate products on the individual and corporate levels. Those with low income and limited literacy will ultimately still choose to purchase counterfeit products by assuming that non-authenticated treatment options are better than no treatment at all (Glass, 2014). One example of the impact of this stems from the manufacturing of altered and low-quality antivirals: "Antibiotics, antituberculosis drugs, and antimalarial and antiretroviral drugs are frequently targeted, with reports of 60% of the anti-infective drugs in Asia and Africa containing APIs outside their pharmacopoeial limits" (Glass, 2014). The direct implications involve increasing drug resistance and therefore undermining the efforts put into developing effective drug formulas, especially in developing countries where treatment for fatal diseases and infections is imperative to the well-being of many. Counterfeits significantly impact global public health because drugs lacking in quality, safety, correct make-up, and efficacy that are not effectively regulated could result in long-term consequences. These include prolonged therapy and hospitalization, promotion of resistance, and the causation of adverse effects in consumers, which are then not accurately recorded or monitored (Glass, 2014). On the individual economic level, counterfeits contribute to increasing out-of-pocket spending on healthcare, lost income due to prolonged illness or death, and lost productivity costs to individuals and households when seeking additional medical care, the effects of which are felt by businesses and the wider economy (OECD/EUIPO, 2020). The environmental impact is another significant though often overlooked implication of the counterfeit trade since legitimate pharmaceutical companies must adhere to established environmental protection and anti-pollution regulations while illicit manufacturers do not; they often dispose of toxic dyes and chemicals without oversight and disregard the importance of avoiding chemical leaks into streams and other natural resources (OECD/EUIPO, 2020). It is also important to acknowledge that other crimes such as money laundering, human trafficking for sexual exploitation, and the smuggling of illegal arms can be linked to criminals involved in pharmaceutical crime (OECD/EUIPO, 2020), so the scope of this issue expands far beyond the sole impact of fake drugs and medical apparatuses on individuals and companies.

THE ECONOMIC IMPACT & FTZS

Counterfeiters impact both genuine manufacturers and consumers economically, making regulatory measures beneficial to both ends of the supply chain and requiring the attention of regional and international organizations in addressing the problem. The Organisation for Economic Co-operation and Development (OECD), for instance, has contributed significantly to informing policy-makers through detailed research and analysis of the economic impact of counterfeit circulation in the market. They recognize various factors that are conducive to the success of illicit traders, including trade routes and politics. Counterfeit producers determine the who, what, and where of their operations through considering "1) the characteristics of the market, which determine market potential; 2) technological and logistical considerations, which determine the feasibility of counterfeiting; and 3)

"Those with low income and limited literacy will ultimately choose to purchase counterfeit products by assuming that non0authenticated treatment options are better than no treatment at all."

the institutional environment, which determines the risks of being caught" (OECD/EUIPO, 2020). The complexity of the trade routes utilized by counterfeit suppliers is vital to recognize because it "facilitates the falsification of documents in ways that camouflage the original point of departure, establish distribution centres for counterfeit and pirated goods, and repackage or re-label goods," all of which often are undetected due to the fact that in-transit goods are outside the scope of local authorities (OECD/EUIPO, 2019).

Counterfeiters also thrive in politically unstable environments where corruption and ineffective property protection policies greatly influence the amount of exports of fake goods from an economy. Despite their beneficial aspects, countries with free trade zones (FTZs) with strong infrastructure and limited surveillance also provide a relatively stable environment for counterfeiters to operate in. Interestingly the existence, number, and size of FTZs in a country positively correlate with increases in the number of counterfeit products exported by that country's economy (OECD/EUIPO, 2019). A notable case of such an occurrence took place in 2006 when a counterfeit shipment from the Sharjah FTZ in Dubai was seized in transit to the FTZ of Freeport in the Bahamas and involved several countries. After the fake products were intercepted in the Bahamas, suspicious products still being stored in the Sharjah FTZ were moved to another facility in the Jebel Ali Free Zone in Dubai in an attempt to evade authorities. The investigation eventually exposed an elaborate supply chain of knockoff drugs that ran from China through Hong Kong, the United Arab Emirates, the UK, and the Bahamas to eventually be sold online to unsuspecting consumers as Canadian medicines. This exhibits the convoluted nature of the crime at hand and how FTZs serve as low-risk stepping stones in the elaborate schemes behind successful counterfeit operations, making regulatory adjustment measures crucial, especially in areas with limited surveillance. Countries that encounter large amounts of counterfeit healthcare products risk discouraging foreign investment, thus limiting their potential for economic growth and opportunities for further innovation and development in the healthcare sector (OECD/EUIPO, 2020).

TECHNOLOGIES AND POLICIES ASSISTING IN CURBING COUNTERFEIT TRADE
Beyond easily targeting those with lower socioeconomic status and limited healthcare availability, the ever-expanding e-commerce market has provided illicit suppliers the opportunity to reach an even greater consumer base, largely including those who unknowingly fall victim to well-advertised illegitimate pharmacies and websites. Many fake drug products enter the market through illegal online pharmacies that operate globally and often beyond the scope of local or international regulators, and digital channels enable these illicit companies to evade detection (Kuppuraj, 2018). Large sums of money are involved in transnational criminal networks and enterprises, with one illicit online pharmacy network earning USD 55 million during only two years of active operations (OECD/EUIPO, 2020).

Another important term involving the dangerous distribution of certain products to specifically targeted countries or demographics is anti-diversion, which aims "to ensure that products that have been developed for a specific market, perhaps with materials that are not allowed in other countries but are authorised for the intended market... are not removed from the supply chain, repackaged and sent into a country that should not receive that item" (Ellison & PRISYM ID, 2019). There are both passive and active approaches to addressing the dangers of counterfeit healthcare, like the aforementioned diversion tactics. The passive strategy focuses on the three levels of packaging of products, with manufacturers being encouraged to include visual deterrents in the form of holograms, UV codes, or unique barcode labels that could assist in proving authenticity. The active approach involves using technology in regulating products as they pass through the supply chain. Unique serial or reference numbers (URN) allow mass serialization systems to check authenticity and assist in tracking products through the supply chain, which is becoming increasingly efficient and effective as technology advances (Ellison & PRISYM ID, 2019).

Several facilitation policy strategies could prove helpful in decreasing the number of counterfeit healthcare products being exported. Specifically, these would involve the availability of detailed information on trade flows, the degree of involvement of an economy in the trade community, transparent and methodical review of fees and charges imposed on imports and exports, and reliable internal cooperation between border agencies and other government units (OECD/EUIPO, 2019). Regarding the specific problem of counterfeit healthcare, the International Medical Products Anti-Counterfeiting Taskforce (IMPACT) was established in 2006 to coordinate a response to the growing issue of counterfeit drugs and to focus on the

following key areas: legislative and regulatory infrastructure, regulatory implementation, enforcement, technology, and communication (Glass, 2014). IMPACT demonstrates that successfully combating the trade of counterfeit medical products requires the efforts of others beyond the health sector. Collaboration among other sectors including law enforcement, border control, justice departments (at all administrative levels), and the private sector, which includes members of the supply chain like manufacturers, importers, distributors, health professionals, media, and patients and other consumers is essential (World Health Organization, 2019). Initiatives from the WHO's "prevent, detect, and respond" approach have introduced and begun to maintain a global database of reports relating to the interception of substandard or counterfeit medicines for use by regulatory agencies globally as well as a "Rapid Alerts" mechanism that facilitates international communication and data exchange (OECD/EUIPO, 2020).

Governments and regional justice systems hold a great deal of responsibility to be involved in efforts to protect global public health, especially regarding legislation. One example of higher power organizations taking initiative is when the Council of Europe developed the MEDICRIME Convention, which equipped countries with a prototype of a legal framework for facing the threat of counterfeit medicines and other types of medical sector crimes that threaten public health and the economy (OECD/EUIPO, 2020).

The biopharmaceutical company Sanofi has also become a leading example of providers increasing their responsibility for being aware of the importance of screening for counterfeits. In 2008, they opened their Central Anti-Counterfeit Laboratory (LCAC) to counter illicit companies targeting their product design for profit and recorded over 43,000 suspicious products. Furthermore, they developed a specific label containing visible and invisible authentication known as the Sanofi Security Label to prevent mistakes in the supply chain (Kuppuraj, 2018). Their official website provides

guidance made available to the public in how to personally inspect products at home before consuming them as well as in recognizing red flags in pharmaceutical websites and online web pages, demonstrating how regulating false products can be a responsibility of everyone involved in the supply chain from manufacturers to suppliers to consumers to ensure safety and damage control.

CONCLUSION & MODERN CONTEXT

Evidently, the increasing amount of counterfeit trade in the healthcare industry is a pressing global public health concern. Economically, ambiguity and lack of effective regulatory systems throughout the supply chains involved in circulating falsely advertised and manufactured medicines, medical devices, and non-drug accessories like PPE impact not only local and global value chains and economies but also the faith of the public in reputable companies and healthcare as a whole. A cooperative, joint effort between suppliers, pharmaceutical companies, manufacturers, customs officials, and even consumers to continue developing more effective policies, technological systems, and protective strategies to decrease the presence of counterfeit healthcare goods in the market is essential to addressing the gravity of this problem, which has only worsened since the onset of the COVID-19 pandemic. A myriad of issues has emerged in the face of the novel coronavirus involving counterfeits that endanger healthcare workers and patients, including the production of insufficient filtering facepiece respirators and masks during the PPE shortage of early to mid-2020 (Ippolito et al., 2020). This problem required the efforts of trustworthy organizations like the Center for Disease Control (CDC) to inform the public on identifying authenticity in protective gear, though the growth of the e-commerce market and dire circumstances often led consumers to feel that unauthenticated equipment would be better than nothing.

N95 masks were also in high demand at the time, creating a new target market for counterfeiters to take advantage of. According to a reputable news source, counterfeits began appearing at the front lines with, for example, Holy Name Medical Center in Teaneck, New Jersey, receiving a batch

"...the dangers of the counterfeit healthcare trade willcontinue to worsen in the face of new global health challenges and an every-changing technological world..."

of 1,000 N95 masks from a trusted longtime vendor that turned out to be fake at the epicenter of the outbreak in the state (Kavilanz, 2020). This incident, among other evidence, indicates that the dangers of the counterfeit healthcare trade will continue to worsen in the face of new global health challenges and an ever-changing technological world, requiring the consistent efforts of countries worldwide in countering its effects in the best interests of both local and international communities.

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SOMEONE LIKE ME

Exploring How Mentors Influence Sense of Belonging for Undergraduate Students of Color

MAIYA WHALEN

AT THE UNIVERSITY LEVEL, STUDENTS' SENSE OF BELONGING HAS BEEN RECOGNIZED AS A POSSIBLE LEVER TO FOSTER SUCCESS, ENGAGEMENT, AND WELL-BEING. A STUDENT'S SENSE OF BELONGING ENTAILS AN INTRINSIC MOTIVATION TO PERSIST WITH THEIR DEGREE AS WELL AS SOCIAL ACCEPTANCE; FOR STUDENTS OF COLOR, THEIR SENSE OF BELONGING IS AFFECTED BY RACE RELATED ISSUES AS WELL. RESEARCHERS HAVE EXPLORED THE SENSE OF BELONGING AND EXPERIENCES OF STUDENTS OF COLOR AT PREDOMINANTLY WHITE INSTITUTIONS, AS WELL AS THE DYNAMICS OF MENTORSHIPS BETWEEN STUDENTS AND STAFF OF COLOR, BUT THE INFLUENCE OF HAVING A MENTOR OF COLOR AS A STUDENT OF COLOR ON THE SENSE OF BELONGING IS UNCLEAR. THIS ARTICLE USES DATA FROM A SURVEY OF STUDENTS OF COLOR AND AN INTERVIEW WITH A STUDENT OF COLOR TO UNDERSTAND THE IMPACT A MENTOR OF COLOR HAS ON STUDENTS OF COLOR. OUR FINDINGS INDICATE THAT A COMBINATION OF BOTH ACADEMIC AND INTERPERSONAL SUPPORT FROM MENTORS OF COLOR ARE UNIQUELY INFLUENTIAL FOR STUDENTS OF COLOR AND THEIR SENSE OF BELONGING AT THE UNIVERSITY LEVEL. IT IS CLEAR THAT MENTORS PROVIDE SIGNIFICANT SUPPORT TO STUDENTS OF COLOR BOTH EMOTIONALLY AND PROFESSIONALLY, SO EFFORTS TO IMPROVE OR CREATE SUPPORT SYSTEMS FOR STUDENTS OF COLOR SHOULD BE ENCOURAGED.

1. INTRODUCTION

"Sense of belonging" is an idea that has existed in multiple fields, including sociology, education, and other social sciences. In general terms, a sense of belonging means a "feeling of relatedness or connection to others," (Booker, 2016). More specifically, a sense of belonging at the university level entails an intrinsic motivation to persist in their degree as well as social acceptance within the student community (Booker 208 2016). Students' sense of belonging has also been recognized as a possible lever to foster success, engagement, and well-being at university (National Academies of Sciences, Engineering, and Medicine [NAS], 2017).

Research has revealed that students at four-year schools, students in the racial-ethnic minority, and first-generation students report lower senses of belonging than their peers (Gopalan & Brady, 2019). Moreover, students of color struggle with feelings of isolation, separation, as well as weariness from the lack of race representation and microaggressions (Booker, 2016). These feelings of isolation, separation, as well as weariness from race related issues can have a serious impact on whether or not students feel as though they belong at their university. Research has also shown that "college students' sense of belonging, especially early in their college careers, may be important for their academic motivation and success in that setting," (Freeman, 2007). It is clear that the sense of belonging of students of color is affected by race-related issues, as well as academic motivation and social acceptance. Where these issues interfere with academic motivation and social acceptance is where students of color must be significantly supported.

Although researchers have explored the sense of belonging and experiences of students of color at predominantly white institutions, as well as the dynamics of mentoring relationships between students and staff of color, it is unclear whether having a mentor of color as a student of color influences their sense of belonging. Thus, the goal of this study is to explore the potential contribution of having mentors of color has on the sense of belonging of undergraduate students of color.

2. LITERATURE REVIEW

There are multiple definitions of sense of belonging for students. According to Goodenow (1993), sense of belonging is the extent to which students feel personally accepted, respected, included, and supported by others in their school's social environment. Finn and Zimmer

(2012) posited a model of school engagement that included three components: identification with the school to a small extent, a sense of belonging to the school, and a belief that they are welcomed, respected, and valued by their peers and other members of the school. Researchers have also found associations between students' sense of belonging and a number of adaptive motivational beliefs, between academic engagement and success, and between emotional well-being and avoidance of risk taking behaviors (Freeman, 2007). For the purposes of this study, we will use a definition of sense of belonging that focuses on the academic engagement of students as well as social acceptance.

Sense of belonging has been thoroughly researched at multiple levels of education, including kindergarten through 12th grade (Goodenow, 1993), as well as at the postsecondary education level (Gopalan & Brady, 2019). At four-year universities, feelings of belonging projected better persistence, engagement, and mental health (Gopalan & Brady, 2019). For students of color, if they do not feel like a part of the greater learning community, they may feel excluded, which negatively affects their performance in the course and subsequently influences degree persistence (Booker, 2016). A number of researchers have also found that a sense of belonging has a powerful impact on academic performance and motivation of students. Furrer and Skinner (2003), as well as Stipek (2002), demonstrated that students' sense of relatedness to key figures, which is a notion related to a sense of belonging, is connected to their emotional and behavioral engagement in school. Support from teachers and peers is also essential to fostering students' academic motivation in elementary, middle, and high school levels of education (Covington & Dray, 2002). At the collegiate level, findings have suggested that sense of belonging is also associated with academic motivation, as it is with younger students. In particular, instructors who encouraged student participation and interaction contributed remarkably to college students' sense of belonging (Freeman, 2007).

3. METHODS
Participants
This study utilized a survey as well as an interview to collect data. The survey was the best method to collect quantitative data on the views of participants, while the interview was ideal to elaborate on the data collected by the survey. The survey was completed by eighteen undergraduate students at a private, predominantly white

institution on the East Coast who identified themselves as students of color among a range of different ethnicities. Of the participants in the survey,there were twelve freshmen, four juniors, one sophomore, and one senior. Participation was voluntary and anonymous. This study also interviewed a student of color who was a senior at the university.

Data Collection

The survey used branching capabilities to allow for different questions based on whether or not a student had a mentor of color. Nine students indicated that they had a mentor of color on campus, and the remaining nine students did not have a mentor of color on campus. The survey also utilized a variety of question types, such as questions involving a Likert scale, yes or no questions, as well as open ended questions with a text box to gain a broad array of information. The use of questions that provided some qualitative data allowed there to be flexibility in the answers that were gleaned. The quantitative data collected by surveys showed areas where more intimate research was necessary. These areas were able to be more fully explored in the interview segment of the study, as the questions asked in the interview portion of the study were formulated based on the results of the survey and which areas needed to be further explored.

4. FINDINGS

Survey

The survey contained a variety of questions that asked primarily about meaningful relationships with professors of color vs. white professors, levels of engagement with professors, how having or not having a mentor of color has impacted students' academic lives, and how microaggressions and racially motivated incidents have influenced their academic persistence. There was variation in which professors students of color developed meaningful relationships with; professors of color maintained the most number of students However, students reported similar levels of engagement with both white professors and professors of color, with the exception being no report of level 10 engagement in classes taught by white professors, while there was a significant amount of level 10 engagement reported in classes taught by professors of color. For students that did have a mentor of color, having a mentor of color had a largely positive impact on their perception of what jobs are possible for themselves. In numerous situations, mentors were able to show their mentees that people of color could have certain jobs that they believe they could not have or were recommended to job and opportunities outside they may

have otherwise not have pursued. An open-ended question concerning unique ways that mentors supported their academic careers was included to gain insight into how mentors supported their students both emotionally and academically.

A shocking conclusion gathered by these questions included that all of the students who had a mentor of color have seen or experienced micro-aggressions or harassment based on race, while 66.7 percent of students without a mentor of color have. Based on following questions in the survey, even though there is some variation in the answers, it seems as though racially motivated incidents do not impact the decisions of students to persist at the university level and continue their schooling. Some students reported the incidents do impact other aspects of their life, such as social life or overall college experience. This survey generally revealed that students generally agreed that having meaningful relationships with a professor or mentor of color positively helped or could help navigate difficult situations.

Interview

The interview was conducted with one senior at the university that identified as a student of color. The survey revealed the importance of having mentors of color for students of color became clearer; both in professional and emotional ways that mentors support students. The social implications of being a person of color and the positive role that mentors play in social life became apparent. Of note, not all mentors discussed were professors or part of administration; they were fellow students as well.

The survey brought up the question of what professors of color may be bringing to their classes that warranted such high feelings of engagement, and the interview revealed that certain professors of color may take a certain level of care for sensitive topics. The interviewee noted that regarding the murder of Emmett Till, one of her Black professors, "focused on the response of the people rather than focusing on the specific act even though she did talk about it because it's important to address them and raise awareness for them." This may have been a response to the situation that other professors may not have had.

The survey revealed that for students with a mentor of color, having a mentor of color had a largely positive impact on their perception of what jobs are possible for themselves. Their answers as to how mentors supported

"...sometimes students of color can run into obstacles with white professors because of issues concerning possible white savior complexes, while professors of color tend to 'keep it more real'..."

them included both academic and emotional support, which pointed to interpersonal support being an important part of mentorship. This finding was further supported by the interview. The interviewee discussed not only how multiple mentors helped her find a job, but how they also gave her time, listened to her problems, and gave good advice. The interviewee believed that "wisdom is key to a mentor," and that one of her mentors is "someone I can vent to and cry." Regarding jobs, the interviewee noted that seeing people of color in positions of power or in the career she aspired to be in was "very powerful" for her, which supports the survey finding that having a mentor of color has a largely positive impact on students' perception of what jobs are possible for themselves.

The survey also revealed that racist incidents impact other aspects of their life such as social life and overall college experience, and this became more apparent during the interview. The interviewee described a situation where her friends decided to give all the illegal alcohol they had to their friend who was "white-passing," to avoid getting in trouble. Overall, the interviewee agreed that having mentors of color was extremely beneficial for her both personally and professionally.

5. DISCUSSION
This study has supported and expanded upon the existing literature concerning students' subjective sense of belonging as well as the interpersonal and academic support that mentors provide. More specifically, this study has extended the literature concerning the unique experiences students of color have in academia and how mentors are able to support them, as demonstrated by the various relationships formed between professors and students of color. Six students reported professors of color,, while three students reported white professors, four students reported both white professors and professors of color, and five students reported developing meaningful relationships with neither. The interviewee pointed to the fact that sometimes students of color can run into obstacles

with white professors because of issues concerning possible white savior complexes, while professors of color tend to "keep it more real." These findings relate to previous research that revealed that the decision of a group of African American students to persist at college was based on faculty being accessible, approachable, and providing authentic instruction (Booker 2016). Issues with "white savior complexes," may feel inauthentic to students of color, which may influence their decision to reach out to these professors as mentors or persist with the class or their degree. Survey participants reported similar levels of engagement with both white professors and professors of color, with the exception being no report of level 10 engagement in classes taught by white professors, while there was a significant amount of level 10 engagement reported in classes taught by professors of color. The interviewee mentioned that a class that she took with a professor of color made her feel "very empowered as a person of color," and that it is "good having the person in the room with all the power being a black woman," which could point to shared or personal experiences being a large part of engagement.

For students of color with mentors, having a mentor of color had a largely positive impact on their perception of what jobs are possible for themselves. An open-ended question concerning unique ways that mentors supported their academic careers was included to gain insight into the multitude of ways mentors support students; the answers to this question included both emotional as well as academic support which points to interpersonal support being an important part of mentorship. This finding relates to previous research which found that mentors maintaining honesty and making themselves available to students were integral parts of a positive mentoring relationship (Luedke, 2017). This finding was further supported by the interview. The interviewee discussed not only how multiple mentors helped her find a job, but how they also gave her time, listened to her problems, and gave good advice. The interviewee believed that "wisdom is key to a mentor," and that one of her mentors is "someone I

can vent to and cry." Survey participants also revealed that their mentors supported their academic careers through writing letters of recommendation and sponsoring independent study. Regarding jobs, the interviewee also noted that seeing people of color in positions of power or in the career she aspired to be in was "very powerful" for her which supports the survey finding that having a mentor of color has a largely positive impact on students' perception of what jobs are possible for themselves. The role of mentors finding students jobs relates to ideas of social capital discussed in previous research that found that students of color sought out staff of color who were able to develop meaningful relationships with the students by nurturing the multiple forms of capital the students brought with them (Luedke 2017).

100 percent of the survey participants who had a mentor of color have seen or experienced micro-aggressions or harassment based on race, while only 66.7 percent of students without a mentor of color have. Although it is a relatively small difference, a possible explanation for this could be that those who have seen or experienced micro-aggressions or harassment based on race are more likely to seek out support by forming a relationship with a mentor. Previous research discovered that students of color struggled with feelings of isolation, separation, and weariness from race representation and microaggressions (Booker 2016). These feelings from racially-motivated incidents may be a strong reason for students of color to seek out mentors. An anecdote from the interviewee supported the weariness that students of color feel from race representation; she described a situation where the name tags of the multicultural community were torn off their doors by a group of male students. The interviewee felt "embarrassed," and did not understand how it only happened to the floor housing students of color instead of hallways housing white students. This relates to previous findings that students of color have an "awareness" of the division between the separate worlds of the white majority and the world of the students of color (Morrison 2010). Some survey participants reported

the incidents impact their social life and overall college experience and the survey also revealed that students generally agreed that having meaningful relationships with a professor or mentor of color positively helped or could help navigate difficult situations. This became more apparent during the interview when the interviewee described a situation where her friends decided to give all the illegal alcohol they were carrying to their friend who was "white-passing," to avoid getting in trouble. This relates to previous literature that revealed how students of color being stereotyped contributed to the division of the White majority and students of color (Morrison 2010). This may point to different social "rules" that students of color have to follow because they feel as though they will get into trouble more often than their white peers. The interviewee also noted that when a friend of hers got into trouble with the university, she knew she could call her mentors and say "we really need a person of color to help us here," because they understand administration and what it is like to be a person of color. Overall, both the survey participants as well as the interviewee agreed that it was valuable to have mentors of color as a student of color, and it is clear that mentors provide significant support to students of color both emotionally and professionally.

6. CONCLUSION
Limitations
While the use of a survey and an interview was deemed most suitable, these research methods were not without limitations. The sample of survey participants was small, so the generalizability of the findings is uncertain. The interview was only conducted with one participant, so her experiences may not be consistent with the experiences of other students of color. In addition, what participants say in interviews may be different than their actions in particular settings such as classrooms or social settings.

Future Research
Future research in race and sense of belonging among college students would benefit from exploring the impact of student mentors versus administrative mentors or the differing social rules that students of color have to follow.

"100 percent of students who had a mentor of color have seen or experienced micro-aggressions or harassment based on race..."
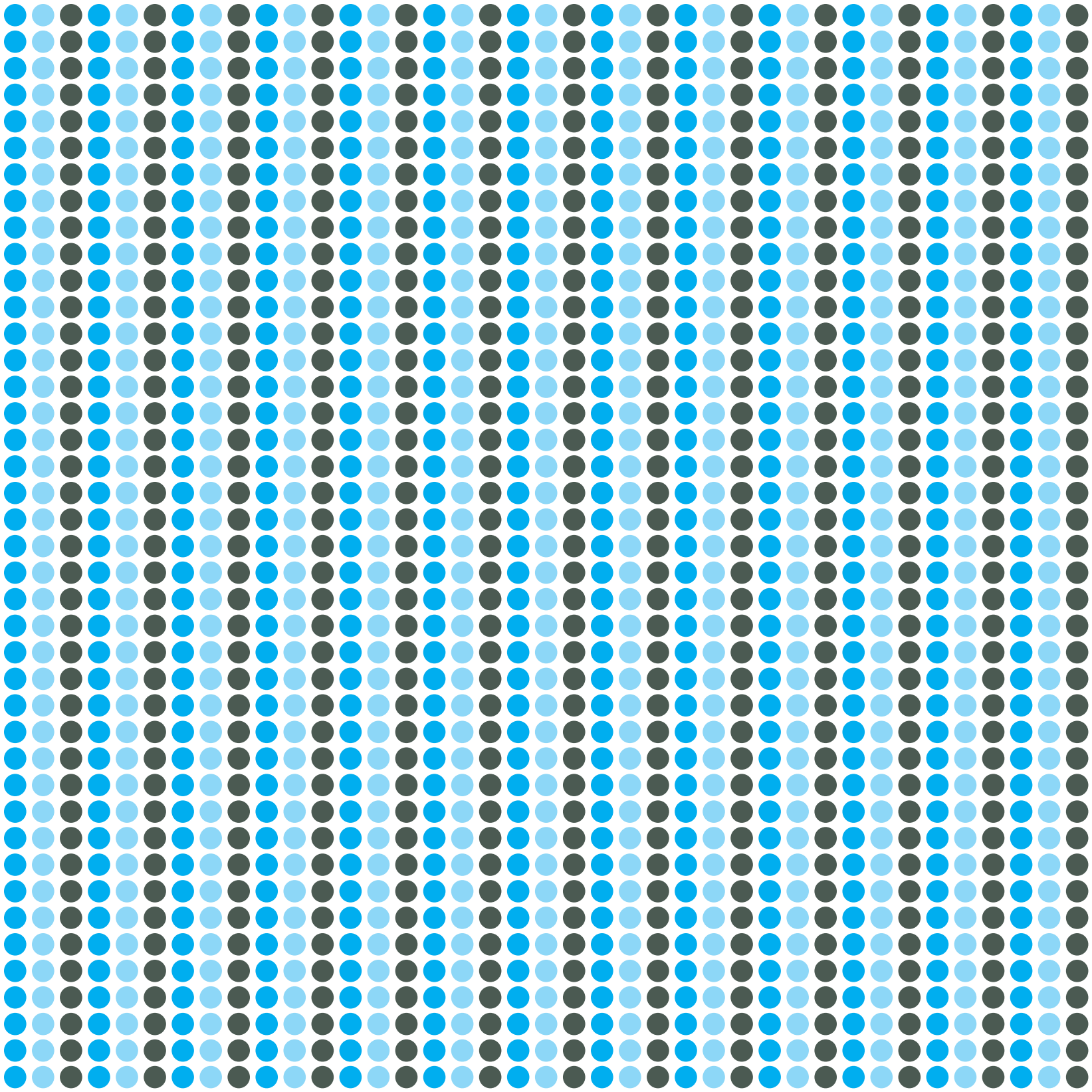
Research into developing mentorship programs for students of color would be beneficial as well. Researchers would also benefit from using multiple research methods, including observational approaches, and using larger groups of participants.

CONCLUSION

Despite the limitations of the study, the findings illustrate the importance of further research into students of color's sense of belonging and how having a mentor of color may influence that. Understanding the positive benefits of having a mentor has the potential to remedy lower senses of belonging that minority students experience (Gopalan & Brady, 2019). It is clear that both emotional and academic support are influential in positive mentorship, so efforts to improve or create support systems for students of color should be encouraged. In summary, the results of this study suggest that college students of color benefit from having mentors of color. This study identified how mentors support the academic and professional components of a sense of belonging through job placements and writing recommendation letters. Mentors of color also provided emotional and interpersonal support to students who don't feel included in the predominantly white student body.The findings of this study ultimately indicate that a combination of both academic and interpersonal support from mentors of color are uniquely influential for students of color and their sense of belonging at the university level.

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RAPTUS ET ROMAUNCE

Discussing the Incongruities of Chaucer and Feminism

TAYLOR MORALES

THIS PAPER SEEKS TO ANALYZE THE INCONGRUOUS NATURE OF GEOFFREY CHAUCER AS THE RO-
MANCE POET AND AS THE COURTIER. IN THIS PAPER, I WILL EXPLORE CHAUCER AS A FEMINIST BY
LOOKING AT THE TWO SIDES OF HIS PERSONAGE—PERSONAL AND PROFESSIONAL. THIS PAPER
WILL DELVE INTO THE HISTORY OF *RAPTUS* AND ITS CULTURAL SIGNIFICANCE AT THE TIME—LOOK-
ING IN PARTICULAR AT THE CASE OF *RAPTUS* BROUGHT AGAINST CHAUCER INVOLVING CECILY
CHAUMPAIGNE AND ITS SUBSEQUENT DISMISSAL. MORALES PLANS ON HIGHLIGHTING THE DI-
CHOTOMOUS THEMES OF TWO OF CHAUCER'S WORKS: *THE CANTERBURY TALES* AND *THE LEGEND
OF GOOD WOMEN* IN PARTICULAR. THIS PAPER WILL ANALYZE AND CHALLENGE THE ANTIFEMINIST
REPRESENTATIONS OF WOMEN IN THOSE POEMS FOUND IN *THE CANTERBURY TALES* AS COMPARED
TO *THE LEGEND OF GOOD WOMEN*—IN ADDITION TO THE MENTION OF OTHER MISCELLANEOUS
WORKS. THIS PAPER WILL ESTABLISH THAT THE INCLUSION OF WOMEN IN CHAUCER'S CONSIDER-
ATION OF HIS AUDIENCE AS WELL AS HIS ENGAGEMENT WITH DIVERSE MODES OF WRITTEN WORD
HELPED CATALYZE THE SHIFT FROM THE TRADITIONAL ROLE OF WOMEN IN ROMANCE LITERATURE
AS COMPARED TO WHAT CAN BE SEEN IN SOME OF HIS LATER WORKS.

The fourteenth century was quite a tumultuous time to be alive in England; the Hundred Years War, Black Death, and Peasants Revolt are just a few examples of the events that occupied this short spread of history. Despite all of this, individuals like Geoffrey Chaucer still managed to produce impactful poetry and literature that are still studied to this day by scholars around the world. One does not think to associate a time of such cultural upheaval as the fourteenth century in England with progressive thoughts like feminism. However, this is not the case as Chaucer took advantage of his position as a well-received romance poet and helped catalyze what I would argue to be the beginning of feminist representation in romance poetry at that time. While it is largely understood that Chaucer, the courtier, perpetuated systems that were inherently anti-feminist and even went so far as to have charges of *raptus* brought against him by individuals of high esteem, it is necessary to look at his contributions to feminism as a poet separate from his personage as a courtier. Feminism—defined as the understanding of women to be autonomous and conscious-minded individuals who exist in a capacity outside of just physicality—was something that was nonexistent within the genre of romance at the time of Chaucer's career. His shift from the seemingly toxic patriarchal representations in his poems *The Knight's Tale*, *The Miller's Tale*, and *The Reeve's Tale* to the progressive and empathetic depictions of women in *The Legend of Good Women* can only be seen as feministic.

As the succession of King Edward III by ten-year-old Richard II occurred, the ideal time to challenge the status quo had presented itself; a young king coming into power and a shift in the social order of the courts meant more leniency for literary publications. The unrelieved succession of events beginning with the Hundred Years War, Black Death plague, the Statute of Laborers, the Western Schism, and then Peasants Revolt meant there was no respite for English society to stop and think about things as nominal as written work. As new thoughts and cultural norms came and went over this expanse of time, something as outlandish as early feminist theory would be safe to try out—especially in a medium like romance poetry composed in the vernacular language of Middle English. If early feminism was rejected, it could be chalked up to any number of the societal changes occurring at the time; however, if it stuck, the implications for the succeeding generations of romance poets and women in the realm of literature were great.

In her article titled "The Language of Ravishment in Medieval England," Caroline Dunn asserts that "understanding *raptus* is the essential starting point for anyone exploring the offenses of rape or abduction in medieval England" (Dunn 87). As it was a highly contentious issue with an ambiguous etymology, *raptus* in the fourteenth century is something that has proven to be difficult for historians to ascertain. As the raptus statutes in England at the time were encompassing to the three different facets of the term—sexual assault, abduction, and theft—when dealing with cases brought to the legal system, it is hard to retroactively pinpoint the exact offense that one Geoffrey Chaucer was found guilty of in his case of *raptus* against Cecilia Chaumpaigne in 1380. While she officially dismissed all charges of *raptus* brought against him, it is important to question the actions of Chaucer and the nature of his crime—especially when considering him through the lens of feminism. The verbiage found within Chaumpaigne's release of Chaucer has been analyzed by many, particularly focusing on the term *de raptu meo* in the document as it "raises the troubling possibility that Chaucer was a rapist" (Cannon 75). Furthermore, the phrase *de raptu meo* "cannot be found in any other document in [the close rolls] during any of these eight years" (Cannon 77). Cannon goes on to say that "there are in fact only two other records in the close rolls in this period that use some form of the verb *rapere*, from which the noun *raptus* is derived, and only one other record in these rolls that actually uses the noun *raptus* itself. The bulk of the releases during these eight years are so vague that in fact that their contents are described in the Calendar of the Close Rolls as general" (Cannon 77). The incongruity of this particular legal terminology as compared to the rest

"As new thoughts and cultural norms came and went over this expanse of time, something as outlandish as early feminist theory would be safe to try out..."

of those of similar nature should not be overlooked. Dunn concludes her scholarship by citing, "Chaucer's contemporary John Gower offers a view of rape that displays these necessary nuances, for he demonstrates that patriarchy was alive and well in later medieval England but that men's preference for controlling women, along with their frequent ability to do so, did not make rape morally acceptable" (Dunn 115). Because there is no way of truly understanding the implications of Chaucer's engagement with *raptus* as a result of the intrinsic nuances present in the term itself, we should take Gower's lead in acknowledging that because of the nature of the patriarchy in the contemporary society they lived in, there was an affinity for such ravishments that were more normalized than that of what our society accepts today. This understanding does not then free Chaucer from any retroactive judgements but rather allows for future readers and historians to engage with his work in such a way that is mindful of the possibilities of his case of *raptus* while still considering the environment and society that might not be congruous with that of which we exist in.

Dunn works to bring some clarity to the different delineations of *raptus* in the documented cases in the form of a table that classifies the 1,213 cases of ravishment as "abduction, rape, ambiguous, both" in addition to the breakdown by century from the thirteenth through fifteenth centuries. Her ability to do this lies in her close reading of the additional terms included in the legal documentation of the cases like *"vi concubuit contra voluntatem,"* meaning a man laid "with a woman violently against her will" (Dunn 90). The terminology pertaining to abductions could be traced back to the legal verbiage of *"cepit,"* meaning "s/he took" (Dunn 90). By looking to these external indicators within the documents and taking into account the possibility that "it is possible that some of the sexual relations prosecuted were consensual, and certainly some of the abductions were" (Dunn 90), Dunn is able to get a more holistic understanding of the nature of the majority or plurality of the *raptus* cases at the time. As she was able to deduce through her table in her writing, cases of *raptus* specifically and singularly pertaining to rape were in the gross minority in the fourteenth century—as represented as just 6% of the cases of *raptus* in that century. The majority of the cases—as represented as roughly 52% of the cases of raptus in the fourteenth century—were understood by Dunn to be specifically and singularly pertaining to abduction. However, the statistic we have yet to account for, the 'ambiguous' category in her table, is of great importance to us when considering these

figures in the present context. Roughly 41% of the cases of *raptus* brought up in the fourteenth-century were ambiguous in nature—including that of Geoffrey Chaucer and Cecilia Chaumpaigne. While it would be easy to give Chaucer the benefit of the doubt and assume that his case of *raptus*—as it was released by the victim herself and perceivably by her free will—would have fallen in with the majority of cases as involving abduction, this would be negligent when dealing with a character-based claim pertaining to feminism.

It is difficult to discern the motives behind a well-esteemed courtier like Chaucer when regarding his case of *raptus* since Cecilia Chaumpaigne was likely the daughter of a baker and would have provided absolutely no mobility to Chaucer within court circles. Depending on the type of raptus case—either *rapuit et abduxit* (seized and abducted) or *cepit et imprisonauit* (took and imprisoned)—that was brought against Chaucer, one can begin to question and narrow in on the motives that drove him to his crime. What is particularly interesting to note when connecting Chaucer as the potential rapist with Chaucer, the romance poet, is the timing of all of this. *The Legend of Good Women* was understood to have occurred at some point during the composition of *Canterbury Tales* from 1387 until 1400. It is understood that Chaucer undertook this project at the request of Queen Alceste as a sort of "assigned topic" (Benson 587). Separate from all of this, in 1380, Chaumpaigne was drafting and submitting her statements of pardon towards Chaucer. As *The Legend of Good Women* is known to be unfinished, I propose a hypothetical timeline of events that would lend to an explanation of not only the "critical paradox" (Benson 587) that was *The Legend of Good Women*, but also of the external factors that would have lent to the shift in the character of Chaucer.

Beginning with his *raptus* charge against Chaumpaigne in 1380 and its subsequent dismissal that same year, we must look at the potential ramifications of such an accusation on an individual like Chaucer at the time. The permissibility of his offense within the court circles is unknown to us, but the status of Chaucer within these court circles as a low-ranking courtier is known. Word of a charge of *raptus* against an individual with no perceivable social status and resulting in absolutely no mobility on Chaucer's end could have easily gotten around these circles and, even as far as the Queen. In an attempt of imparting penance on the poet, it is understandable that Queen Alceste might have charged him with writing *The Legend of Good Women* as a way of highlighting the value in powerful female figures

and promoting the cause of early feminism. As he engaged in the composition of *The Canterbury Tales* from around 1387 until his death, it is very much understandable that Chaucer might have tabled the Queen's request until closer to the end of his project. I reason this because of the existence of traditionally patriarchal poems like *The Knight's Tale, The Miller's Tale*, and *The Reeve's Tale* that are found in "Fragment I" of *The Canterbury Tales*. As he reached the end of his writings in *The Canterbury Tales*, I believe he began an engagement with the previously ignored *The Legend of Good Women* until his death in 1400. This hypothetical timeline of events would explain why *The Legend of Good Women* is unfinished and why it appears to be out of place with the rest of the writings found in *The Canterbury Tales*—particularly in "Fragment I."

Taking a closer look at "Fragment I" in *The Canterbury Tales*, in Chapter Two of her book *Indecent Exposure: Gender, Politics, and Obscene Comedy in Middle English Literature*, Nicole Sidhu recognizes it as Chaucer's attempt at exploring obscene comedy to "indicate that what is at stake in Fragment One goes beyond gender to other power relations in medieval society" (Sidhu 80). She then goes on to compare the tactics employed in this section to those used by Middle English alliterative poet Willian Langland in his work Piers Plowman. Sidhu suggests that while both poets seek to subtly "critique the power holders of [their] society," (Sidhu 78) Chaucer looks to challenge the "ideologies that govern and justify their authority in the first place" (Sidhu 78). While it is true that both poets might have weaponized their words in such a way as to subvert the untouchables within their society, Chaucer's proximity to these authorities makes his work even more important. It is only through the inclusion of such obscene "fabliau[s]" (Sidhu 76) in *The Canterbury Tales* that the reader is able to recognize the power and effectiveness in Chaucer's poetry when it came to challenging the status quo. By introducing subversive narratives, like those found

in "Fragment I," disguised in a chauvinistic way that would appear to appeal to the established attitudes that were maintained at the time—particularly in those circles—Chaucer gains an access point. It is through establishing pathos with these aristocrats and other courtiers that he is able to introduce feminist sentiments like those found in *The Wife of Bath's Tale* and, separate from *The Canterbury Tales* entirely, in *The Legend of Good Women*. While each one of these fabliaux— *The Knight's Tale, The Miller's Tale*, and *The Reeve's Tale*—lend to the generally understood misogynistic tone of "Fragment I," each seeks to challenge the anti-female social norms in a different way.

Starting with *The Knight's Tale*, the main character is portrayed as a highly chivalrous man whose moral code seems to highlight a dangerous dichotomy between protecting innocent women and ravaging them—as represented in the line "kan hem therfore as muche thank as me," (*Knight's Tale*, ll.1808) which is understood to mean the women owing a debt of gratitude for bedding her. This line highlights the hypocritical code of chivalry that exists in the Knight character. While the criticism of the anti-feminist code of chivalry through the lens of the Knight is limited to the militaristic and feudal class of knights, *The Miller's Tale* is a lot more inclusive to the low-born peasants—as represented in the line "The Miller is a cherl," (*Miller's Tale*, ll.3182) which is understood to mean the Miller is a low-born fellow. Since the aristocrats and courtiers would have perceived a tale whose main character is a low-born man engaging in obscene comedic endeavors as being lighthearted and nonthreatening to them, Chaucer is able to "use the erotic to obscure the political" (Sidhu 85) agenda behind the poem. Since there is a large gap that separates the low-born peasants from anyone existing in the courts, it is easy to use the Miller as a vehicle for more direct political critique "that patriarchal authorities deserve their power" (Sidhu 86). While it is

"While each of these favliaux—The Knight's Tale, The Miller's Tale, and the Reeve's Tale—lend to the generally undestood misogynistic tone of "Fragment I," each seek to challenge the anti-female social norms in a different way."

Image 1: Portrait of Chaucer as a Canterbury pilgrim, Ellesmere manuscript of The Canterbury Tales.

"Fragment I," *The Legend of Good Women*'s "lukewarm critical reception has often been linked to the heavy-handed hints of boredom with which the narrator treats his material" (Allen-Gross 17). One might argue that due to the intrinsically feminist nature of the piece—depicting vignettes of well-to-do historic women as existing independently of their male counterparts. In the G-text of *The Legend of Good Women*, this is represented as a bold statement translated from Legend: "in making of a glorious legend of good women, maidens and wives, that were true in loving all their lives; and tells of false men that betrayed them, that all their (women) lives they did nothing to deserve this test, how many women can claim shame?" In order to offset the possible rejection of the work in its entirety, as a result of content, I argue that Chaucer's seemingly lackluster portrayal of *The Legend of Good Women* is entirely intentional and meant to draw the criticisms away from the content and towards the quality of the writing. In her book *Feminizing Chaucer*, Jill Mann argues that *The Legend of Good Women* exists as "a provisional response to antifeminism, contradicting but not obliterating it...created as antifeminism's mirror-image" (Mann 39).

In another effort of painting Chaucer to be a participant of protofeminist thought in fourteenth century England, I would like to look at Chaucer's appeals to a female audience. In her work "Chaucer's Feminine Pretexts: Gendered Genres in Three Frame Moments," Madeleine Saraceni states that "Chaucer often sought to affiliate himself with genres of literature that bore strong associations with women readers in the medieval cultural imagination and that may have served to identify him with literature that was deemed feminine, that is, literature perceived as written for and consumed primarily by women" (Saraceni 407). This sentiment is carried on in Alison Wiggins' "Frances Wolfreston's Chaucer" where she claims "early modern women are often thought of as having been excluded from literary culture, which is seen as a masculine, homosocial realm" (Wiggins 88). The niche area that was often perceived to be inhabited by women within the literary realm was religious devotional texts. These translations of religious manuscripts for the consumption of laywomen were growing more and more commonplace by the fourteenth century. Saraceni chalks this phenomenon up to "a confluence of factors—including an increase in lay literacy, a climate of devotional fervor, and ecclesiastical reforms that encouraged the production of works designed to aid in the preaching to and instruction of the laity" (Saraceni 416). In the Prologue

written that even the lowliest of the peasantry, the Miller, recognizes the moral superiority that exists inherently in men as opposed to the "fabliau women [who] are almost always figured as immoral beings, wholly focused on the needs of the body, [and] who will do anything to satisfy their lust." (Sidhu 86) Finally, we look at how *The Reeve's Tale* challenges the social norms of antifeminism through the understanding that "all three men [in these tales] are motivated by an anxiety over their social status and a desire to move up the social hierarchy," (Sidhu 90) and see women as sexual temptresses who seek to lead them astray from this goal.

These stereotypes that Chaucer perpetuates in "Fragment I" in conjunction with the retrospective understanding of the potentially politically-subversive motives that Chaucer maintained while writing these over-the-top fabliaux should only be considered to be deeply ironic and should not be taken at face value. Knowing the nature of the critiques, one would be remiss in reading these tales as anything but the opposite of what they are written to mean. Recognizing these tales as such, the shift in tonality in *The Legend of Good Women* is not as jarring. Unlike the garish tactics used to engage the audience of *The Canterbury Tales'*

> *"To shift the power of romance away from the male that typically inhabits chivalric romance tales and towards an inherently feminine character of divine status..."*

of Chaucer's *The Legend of Good Women*, a text known as "De Maria" is referenced as Chaucer's perceived "vernacular devotional text" (Saraceni 415). Though this is a lost text and there is no way to confirm or dispute this belief and we cannot know for sure if Chaucer dipped into the non-secular side of poetry, this could have been a way to appeal to the female-dominated audience that inhabited that space.

Another text that I feel deserves to be mentioned—albeit quickly—when discussing the feminist shift in tonality in Chaucer's poetry is *The Wife of Bath's Prologue & Tale*. The nature of the wife and her portrayal in *The Wife of Bath's Prologue* is somewhat brutish and masculine. Her ability to force the submission of her husbands and then the length at which she rants about their shortcomings, as well as the nature of her free speech, approach the idea of feminist representation in a new way. Chaucer attempts to give the wife her autonomy through his stripping of her traditionally-feminine characteristics and replacement of them with masculine ones. Jill Mann introduces this idea in her chapter "Antifeminism" in *Feminizing Chaucer* when she says, "antifeminism is appropriated by a woman's voice in order to articulate feminist truths', nevertheless, the Wife 'remains confined within the prison house of masculine language'" (Mann 65). It is only through the voice of masculinity that feminism can exist and be heard as "Chaucer could not invent a new 'female language' and sensibly did not try to do so" (Mann 65). So while it may appear that Chaucer's employment of masculinity in the context of the characterization of the Wife in *The Wife of Bath's Prologue & Tale*, it is only as a result of the cutting-edge nature of his thought. Since he was at the forefront of what feminist representation in literature would look like, there were no appropriate systems set in place for him to utilize and, as Mann points out, it was sensible for him to use masculinity as a familiar vehicle for pushing unfamiliar characterizations across to his audience.

In keeping with this notion, I stake the claim that Chaucer's progression as a poet and person towards the end of his life can be seen as a result of his awareness of and attempts towards inclusivity for women in his readership. This is evident in his contemporary John Gower's *Confessio Amantis: "Book 8 (Lechery)"* when Venus, the goddess of love, says, "great Chaucer when you meet him, as he is my disciple and poet: for in the flowers of his youth in various ways, as well as he could, made ditties and songs glad for my sake." There are two things that must be recognized in this reading: the gender of love and the recognition of Chaucer as an important romance poet in other works of equal prestige. Firstly, the gendering of Venus, goddess of love, as a woman is important to note as it is therefore implied that femininity is at the center of romance. To shift the power of romance away from the male that typically inhabits chivalric romance tales and towards an inherently feminine character of divine status is significant because it falls in line with the more progressive representation of femininity and feminism in romance poetry at that time. Secondly, the acclaim of Chaucer at the hands of the feminine figure of Venus and her subsequent praise of his work on her behalf and the behalf of romance signifies approval of Chaucer as a romance poet— particularly through the lens of women. By adding the line, "as he wel couthe," Venus acknowledges that Chaucer's romance repertoire is not infallible and his pro-feminist writings were done to the best of his abilities.

So, is there really such an incongruity between Chaucer the courtier and Chaucer the poet? I would argue that the impact that Chaucer had on fourteenth feminist theory and the movement away from the static, archetypical woman that inhabited medieval romance poetry was entirely a result of his proximity to the influential members of society and his ability to stay within those circles. Touching on Sidhu's comparison of William Langland to Geoffrey Chaucer when looking at their ability to use obscene comedy as a vehicle for political challenging, I would like to add that the reason Chaucer was more successful in his critique of the societal status quo— referring to the perceptions of women specifically— because of his physical proximity to London. While Chaucer resided in London, Langland spent most of his

life in the West Midlands—some distance from London. In his thesis, "The Transport System of Medieval England and Wales - A Geographical Synthesis," James Edwards presents maps of the basic medieval road networks and the known topographical maps of the time. Based on the information presented in these maps, it is inferred that while William Langland was thought to have been socialized in the London circles early in his life, his later years of authorship were not represented in the city. The region he lived in, The West Midlands, were not easily accessible by the known road network and inferred routes of the time. As a result, the political happenings and the shifts in social norms and practices were not as prominent in Langland's writings, which meant his influence on any of those things was minimal at most. However, Chaucer's physical proximity to London and the courts meant that he was more directly influenced and, as a result, could reference the happenings through his work. Now recognizing the significance of the proximity these poets had to the inner workings of those who monopolized the social power, we are able to impart some grace onto the seemingly counterproductive and anti-feminist works Chaucer published. I would argue that these poems are not actually anti-feminist at all when considered in the context of their composition and when viewed not myopically, but rather intuitively.

The poems of Geoffrey Chaucer are double-edged and powerful when read as political pieces. In her writing "Chaucer, Gower, and the Vernacular Rising," Lynn Arner speaks to this saying, "Chaucer's and Gower's writings offer some convergent and some disparate stances regarding this new vernacular poetry in relation to what would now be considered identity politics" (Arner 154). Identity politics in this situation are appropriately attributed to the role of gender identity being called into question in Chaucer's works. She then goes on to say that "Chaucerian poetry instructed readers how to recognize and understand identity-based claims and encouraged them to discount such concerns as inartful, ignorant, and ultimately dismissible" (Arner 155) at the beginning of English literature. This quote examines the relationship between the original intention of Chaucerian poetry and the presently contested state it is known to be. Arner is pointing out that Chaucer armed his audience with the critical thinking skills necessary for the correct interpretation of the political messaging behind his poetry by giving them a cipher of sorts. The last bit of her quote— regarding the discounting of concerns as inartful, ignorant, and ultimately dismissible—can be applied to the

necessary attitudes that the scholars are choosing to engage with seemingly problematic texts like those found in "Fragment I" (*The Knight's Tale, The Miller's Tale,* and *The Reeve's Tale*). Rather than viewing these tales as anti-feministic, Chaucer would encourage the audience to simply dismiss the surface-level understanding of the identity politics at play and go deeper in their analysis of the underlying message that is being expressed underneath all of the bells and whistles that are meant to distract you. These two statements in conjunction with her critical understanding of *The Legend of Good Women* as adopting an "anti-identity stance" (Arner 154) allow for a clear comprehension of the poem's political significance.

In conclusion, Geoffrey Chaucer was a man of many hats. His contributions to the literary community at a time where there was such uncertainty and a loss of overall culture should not be overlooked or discounted as a result of the single unclear case of *raptus* brought against him. In a world where vapid cancel culture permeates our society, it is easy to pigeonhole an individual on the basis of a single transgression. While it might seem reasonable to assume the worst in Chaucer as a result of the Chaumpaigne *raptus* case, it is negligent on our part as scholars who operate with the innate privilege of retrospect. As a result of my challenging and exploring of *raptus-* its etymological origins, cultural significance, and application to that of one Geoffrey Chaucer—I have been able to critically ascertain that Chaucer's writings were inherently pro-feminist and existed as vehicles for subtle political subservience. Through this paper, I have come to the conclusion that the perceived incongruities between Chaucer as the poet and Chaucer as the person—and courtier—are nonexistent below the surface-level understanding of his character.

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LEGALIZING LOVE

Understanding the Effect of Legalizing Gay -Marriage on Adoption Rates in the United States

KATHERINE GARRETT

THIS PAPER ANALYZES HOW THE STATE-LEVEL LEGALIZATIONS AND NATIONAL LEGALIZATION OF GAY MARRIAGE AFFECTED THE NUMBER OF CHILDREN ADOPTED IN THE UNITED STATES—BOTH ON AVERAGE AND IN EACH OF THE FIVE AGE GROUPS. TO THIS END, THIS PAPER USES A DIFFERENCE REGRESSION USING DATA FROM THE KIDS COUNT DATA CENTER, WHICH DETAILS THE NUMBER OF CHILDREN IN EACH OF FIVE AGE GROUPS ADOPTED EACH YEAR FROM 2000 TO 2017. THIS REGRESSIVE ANALYSIS FOUND A 9.1% INCREASE IN THE NUMBER OF TOTAL ADOPTIONS AFTER THE 2016 NATIONAL LEGALIZATION OF GAY MARRIAGE. HOWEVER, THE ANALYSIS ALSO FOUND THAT A STATE'S LEGALIZATION WAS CORRELATED WITH AN 8% DECREASE IN ADOPTIONS IN THAT STATE, CREATING A COMPLEXITY IN THE RESULTS THAT UNDERLINES THE NEED FOR FURTHER RESEARCH. HOWEVER, THE DIFFERENCE IN EFFECT BETWEEN STATE-LEVEL AND NATIONAL LEGALIZATIONS MAY IMPLY THAT THE BARRIERS TO GAY COUPLES ADOPTING IN THE UNITED STATES MAY BE MORE CULTURAL THAN EXPLICITLY LEGAL.

INTRODUCTION

In the United States, around 100,000 domestic children are in foster care waiting to be adopted during any given year. As such, the United States desperately needs willing and able adoptive parents ("Foster Care in the U.S. - Number of Children Waiting for Adoption").

However, the laws governing the adoption process in the United States present a myriad of barriers for individuals wanting to adopt children, particularly for unmarried couples. According to federal statutes, individuals, or couples may legally adopt children. However, a child can only be adopted by a singular legal entity. Individual people and married couples are legally recognized as one entity, but domestic partnerships are not.

If a person in a domestic partnership applies to adopt a child as an individual, the adoption agency's home study of this individual's home must confirm their single status. If the potential adoptive parent is discovered to be living with a long-time partner, their eligibility may be jeopardized ("Do I Have to be Married to Adopt a Child?").

Furthermore, many adoptions in the United States are brokered by private adoption agencies, with little regulation on what kind of requirements they can set for their adoptions. Despite federal laws not explicitly requiring marriage, the agency American Adoptions requires couples to have been married two years or more, and many other agencies require couples to have been married even longer (American Adoptions, Inc.).

With this background information in mind, this brief examines adoption data from 2000 to 2017 in order to assess how the legalization of same-sex marriage—on a state and national level—increased adoption rates in the United States. The first section of this brief will describe the empirical strategy used to explore the correlation between same-sex marriage legalization and adoption rates, while the discussion section will analyze the findings and their significance. Finally, the concluding section will suggest an explanation for these findings and highlight the weaknesses of this analysis.

EMPIRICAL STRATEGY

This paper utilizes adoption data from the Kids Count Data Center, sponsored by the Annie E. Casey Foundation. This data set, which has 540 observations, reveals the number of children that were adopted in each state and nationally from 2000 to 2017. Unfortunately, this data set only provides raw numbers on how many children were adopted each year—not the percentage of children of those awaiting adoption that were taken in by a new family. This nuance limits the results of the regression for reasons discussed later in the paper.

The data also indicate what age group the adopted children fell into, starting with those under one year old. Naturally, the pool of children that were adopted each year were all unique, but by national averages, the age breakdown is as shown in Table 1.

Age Group (years)	Avg. # of Children Adopted	% of Total Adoptees (Avg.)
Under 1	1188	2.25%
1 - 5	27424.94	52.06%
6 - 10	14940.5	28.28%
11 - 15	7678.833	14.53%
16 - 20	1591.056	3.01%
Total	52836.28	100.13%

TABLE 1: AVERAGE PERCENT OF CHILDEN ADOPTED IN THE UNITED STATES EACH YEAR BY AGE GROUP FROM 2000 TO 2017.

For this analysis, the raw numbers of adopted children were converted into a logarithmic dependent variable in order to analyze how gay marriage changed adoption rates in the form of a percent change.

The regression model for this paper also utilized variables that were generated by hand to indicate same-sex marriage legalization based on the year that each state had legalized it. Observations that were taken from a state before that state's legalization of gay marriage were labeled with a "0", and observations from after a state's legalization were labeled with a "1". Another variable was also generated by hand to indicate national legalization, which labeled all observations from after 2015 with a "1" to show that gay marriage had been legalized nationally at the time of the adoptions in question. Table 2 displays the year of legalization for each state.

Alabama	2015	Maine	2013	Oregon	2015
Alaska	2015	Maryland	2012	Pennsylvania	2014
Arizona	2014	Massachusetts	2014	Rhode Island	2013
Arkansas	2015	Michigan	2015	South Carolina	2014
California	2013	Minnesota	2013	South Dakota	2015
Colorado	2014	Mississippi	2014	Tennessee	2015
Connecticut	2008	Missouri	2015	Texas	2015
Delaware	2013	Montana	2014	Utah	2015
D.C.	2010	Nebraska	2015	Vermont	2009
Florida	2015	Nevada	2015	Virginia	2015
Georgia	2015	New Hampshire	2010	Georgia	2015
Hawaii	2014	New Jersey	2013	Washington	2012
Idaho	2014	New York	2011	West Virginia	2012
Illinois	2014	North Carolina	2014	Wisconsin	2015
Indianna	2015	North Dakota	2015	Wyoming	2014
Iowa	2009	Ohio	2015		
Kansas	2015	Oklahoma	2015	Nationwide	2015

TABLE 2: YEAR SAME-SEX MARRIAGE BECAME LEGAL IN EACH STATE (ALPHABETICAL)
SOURCE: GEORGETOWN LAW LIBRARY

potential explanation for this counterintuitive result is that the "StateLegal" variable may not be well specified, therefore violating the first assumption of time series regressions. However, given the high adjusted R-squared values discussed later in this paper—which indicate that the model fits the data very well—it seems likely that there is some other cause. Alternatively, there could be correlation between the independent variables and the errors, which would violate the fourth assumption of time series regressions.

Thus, for this analysis, the log of the adoption numbers was regressed upon a binary variable indicating state legalization of gay marriage, a binary variable indicating national legalization, and a binary variable indicating early legalization. The model also controlled for state and year. This regression was performed separately for every age group, as well as for the aggregate adoption data. This model is intended to control for any differences in adoption numbers that may arise from demographic differences between individual states, such as population. It is also intended to control for the passing of time to try to isolate the effect of the policy change.

RESULTS
Performing a regression analysis on these data yields several interesting conclusions. The most interesting finding is that the national legalization of same-sex marriage increased aggregate adoption rates by about 9.1% (Coefficient = 0.0907). This finding is statistically significant at the 10% level. This coefficient indicates that when gay marriage was legalized, even states that had already legalized gay marriage experienced a statistically significant increase in adoptions.

Interestingly, the coefficient on "StateLegal" was -0.0793, implying that a state's legalization of gay marriage decreased aggregate adoption rates in that state by about 8%. This is also statistically significant at the 10% level, but it is certainly an unexpected correlation. It is hard to say why this decrease occurred or if it is even causal. One

Nevertheless, the coefficients on the "NationwideLegal" and "StateLegal" variables for each age group are displayed in Table 3. The statistically significant negative coefficients on "StateLegal" versus the statistically significant positive coefficients on "NationwideLegal" could be interpreted to indicate that states' legalizations of gay marriage had less of a positive impact on adoption rates than the national legalization. One possible explanation for this disparity could be the social stigma against homosexual couples as parents. It is possible that if a person is against gay marriage, their state governor or

Age Group**	"NationwideLegal"		"StateLegal"	
Total	.091* increase	9.1%	.079* decrease	7.9%
Under 1	-.064 decrease	6.0%	.107 increase	1.1%
1 - 5	.062 increase	6.2%	.0412 increase	4.1%
6 - 10	.175* increase	17.5%	-.219* decrease	21.9%
11 - 15	.0469 increase	4.7%	-.254* decrease	25.4%
16 - 20	.132 increase	13.2%	.123 increase	12.3%

*Statistically significant at the 10% level
**Age in years

TABLE 3: COEFFICIENTS ON "NATIONWIDELEGAL" AND "STATELEGAL" FOR EVERY AGE GROUP

state supreme court legalizing gay marriage would not be enough to make them reevaluate their homophobic views. However, the federal Supreme Court's decision may have been more influential. It was heavily publicized, therefore placing the rights of same-sex couples in the political spotlight in an unprecedented way. Giving the LGBT community the visibility that they had systematically been denied may have hindered their critics' practice of sweeping them under the rug as sociological or biological anomalies. Moreover, the positive, inclusive slogans like "Love is love" could have helped to humanize the LGBT community to its critics.

Ultimately, by whatever avenue, the 2015 Supreme Court decision forced Americans to recognize and respect same-sex couples more than ever before, and it is possible that this shift in social attitudes towards gay couples may have led more adoption agencies to accept gay couples as adoptive parents. This would create the uptick in adoption rates after the national legalization that was not seen after state-level legalizations. Graph 1 provides evidence to support this explanation, illustrating the average number of children adopted in the United States over time.

Since 2015, 2016, and 2017 all saw increasing levels of adoptions, this graph hints that the social normalization prompted by the legalization of gay marriage may have sparked an upward trend in adoption rates that may not yet be over. Unfortunately, adoption data have a lag in availability, so numbers for recent years are unknown. However, assuming recent data follow the same pattern, one possible explanation for this upward trend is that the adoption-related effects of legalizing gay marriage may not have taken full effect yet.

This inference is supported by the fact that the 2015 court decision did not instantly legalize adoption by gay couples in all states. Some states recognized gay couples' right to adopt in 2015, but some states didn't recognize that right until they were mandated to by a 2017 Supreme Court ruling ("V.L. v. E.L.").

That was not the end of the story, however, as even today not all adoption agencies recognize homosexual married couples' eligibility to adopt. As of January 2022, eleven states have legislation explicitly establishing a legal right for religiously affiliated adoption agencies to discriminate against homosexual couples ("Foster and Adoption Laws," 2022). These circumstances illustrate that the extent of homosexual couples' eligibility to adopt in the United
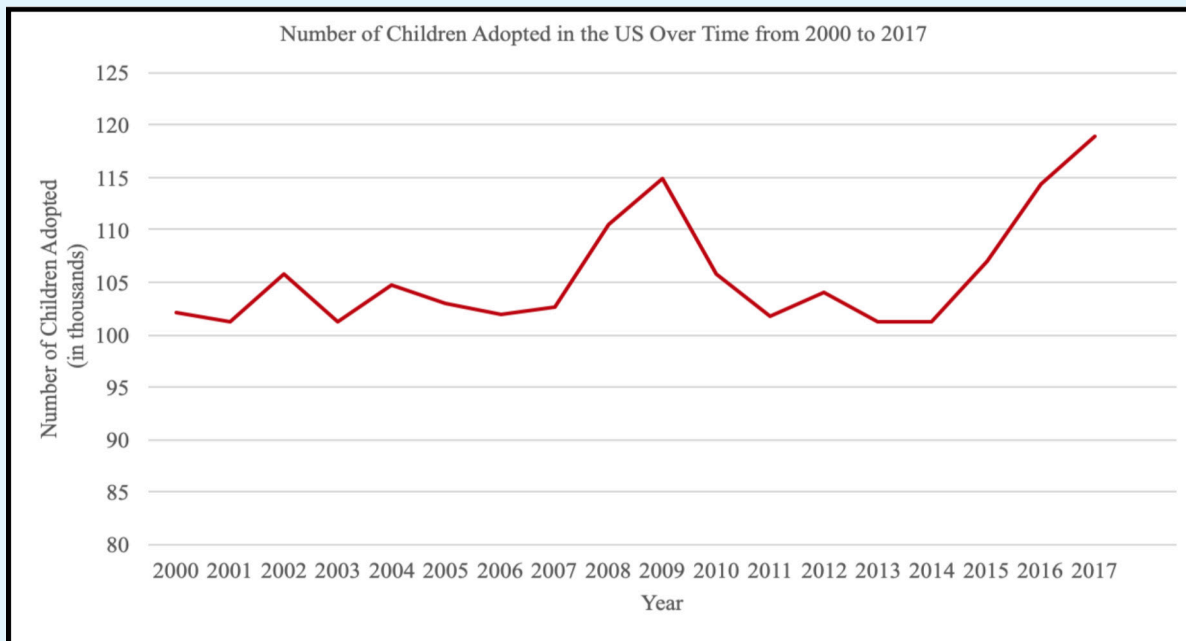
GRAPH 1: NUMBER OF KIDS ADOPTED IN THE US OVER TIME FROM 2000 TO 2017

States has been expanding—and likely will continue to.

Thus, while the legalization of gay marriage made adoption for gay couples considerably easier overall, there were certainly still more barriers in some states at that time. Over time, as more and more of these statutes break down, an upward trend in adoption rates like the one illustrated in Graph 1 may become even more concretely apparent. However, this explanation is just a conjecture. This data trend is too recent for this analysis to convincingly suggest a causal relationship.

However, while many of the findings from the regression potentially tie into this greater, significant social trend, not all of the conclusions carry a practical significance. The analysis found that the coefficient on "EarlyLegalize'' was -.4816 for aggregate adoption data. The coefficient was similarly negative across all age groups, indicating that states that legalized gay marriage earlier had lower adoption rates. This coefficient was statistically significant from zero at the 1% level.

Despite this statistical significance, this finding may not have any causal significance, as it could be due to other factors. The group of states that legalized gay marriage early could be smaller states overall, thus having fewer kids up for adoption. Alternatively, these could be states where adoption is less common on the whole. This variable simply compares one group of states to the other, and thus does not actually illuminate the effects of early legalization of gay marriage. In order to make this coefficient more accurate, subsequent regressions should attempt to control for these variables.

Nevertheless, despite the unfortunate omission of some important control variables, overall, the model used in the regression fits the data well. The regression on the aggregate adoption rates had an R-squared value of .945 and an adjusted R-squared of .941. The five age groups had an average R-squared of .862 and an average adjusted

R-squared of .853. The individual values are displayed in Table 4.

As illustrated in Table 4, the only regressions with adjusted R-squared values less than .90 are those for the under one and 16-20 age groups. These might be outliers simply because there are fewer children adopted in these age groups overall. This amplifies the effect of any changes or any exceptional adoption years, making it harder for any regression to fit the data well.

These relatively small adoption numbers likely also explain the disparities in the standard error values. The standard errors for all of the coefficients in every regression are under .1 except for those for the regression for the same two outlier age groups. These low standard errors indicate that this model fits the data relatively well. The regressions on children under one and above sixteen had slightly higher standard errors likely due to the same reasons as the lower R-squared values.

Overall though, the high adjusted R-squared values indicate that the independent variables included in this regression—state, year, and the coefficients relating to same-sex marriage legalization—explain the variation in adoption rates well.

CONCLUSION AND LIMITATIONS

Overall, this data analysis provides some evidence supporting the hypothesis that the legalization of same-sex marriage increased adoption rates. However, the results from this analysis hint that this increase may not yet be fully realized.

The fact that state legalization of same-sex marriage did not significantly increase adoption rates implies that the barriers to same-sex adoption extend beyond the legal ones discussed in the introduction of this paper. In fact, this result implies that the biggest barriers to same-sex adoption may be rooted in social stigma.

This explanation is supported by the fact that national legalization increased adoption rates. It is possible that national legalization shifted public opinion significantly—considerably more than any one state's legalization did —thus increasing adoption rates. This conclusion is further strengthened by the upward trend in adoption rates since 2015. As Americans become more and more comfortable with same-sex couples, more and more adoption agencies

Age Group (Years)	Under 1	1-5	6-10	11-15	16-20
R-squared	.7482	.9454	.9426	.9070	.7835
Adj. R-sq.	.7316	.9421	.9200	.9013	.7700

TABLE 4: R-SQUARED AND ADJUSTED R-SQUARED VALUES FOR EACH REGRESSION (BY AGE GROUP)

are allowing gay adoptive parents, thus allowing homosexual couples to fill the United States' need for adoptive parents.

However, this is simply one possible explanation. These results may have been produced by a coalescence of other factors. Overall, the only thing this analysis concretely indicates is that more investigation into this topic is needed.

There are also a few weaknesses to this analysis that must be pointed out. Firstly, in order to perform this regression with yearly adoption data, the dates on which gay marriage was legalized in each state had to be rounded to the nearest full year. Unfortunately, this may have blurred the results, given that many legalizations—such as the national legalization in June of 2015—happened mid-year. If the adoption data were categorized by month, this analysis would have yielded more reliable conclusions.

Additionally, since the data are so recent, it is difficult to determine whether the upward trend in adoptions since circa 2015 is significant, or if it is just a spike—like the increase in adoptions in 2008 and 2009. Only time and further investigation will tell if this more recent increase constitutes a trend or not.

Furthermore, as referenced in the introduction, the format of the data is somewhat limiting. The data are presented in the number of children adopted per year, rather than a percentage of children adopted out of the pool of adoptable children. Because the number of children up for adoption varies year to year, in an ideal world this regression should be performed with data on yearly adoption rates. These rates should remain relatively constant over time barring any significant social, political, or economic change.

Overall, while the results from this analysis are not conclusive, they certainly highlight the need for more investigative research into how the growing American acceptance of gay marriage may affect adoption rates in the United States. Ultimately, further research could highlight an additional, hidden benefit in eroding our nation's heteronormative cultural standards. Through taking a stand for sexual equality, we may have the power to increase the number of children who are able to grow up with a permanent sense of belonging in generous, loving families.

"Through taking a stand for sexual equality, we may have the power to increase the number of children who are able to grow up with a permanent sense of belonging within generous, loving families."

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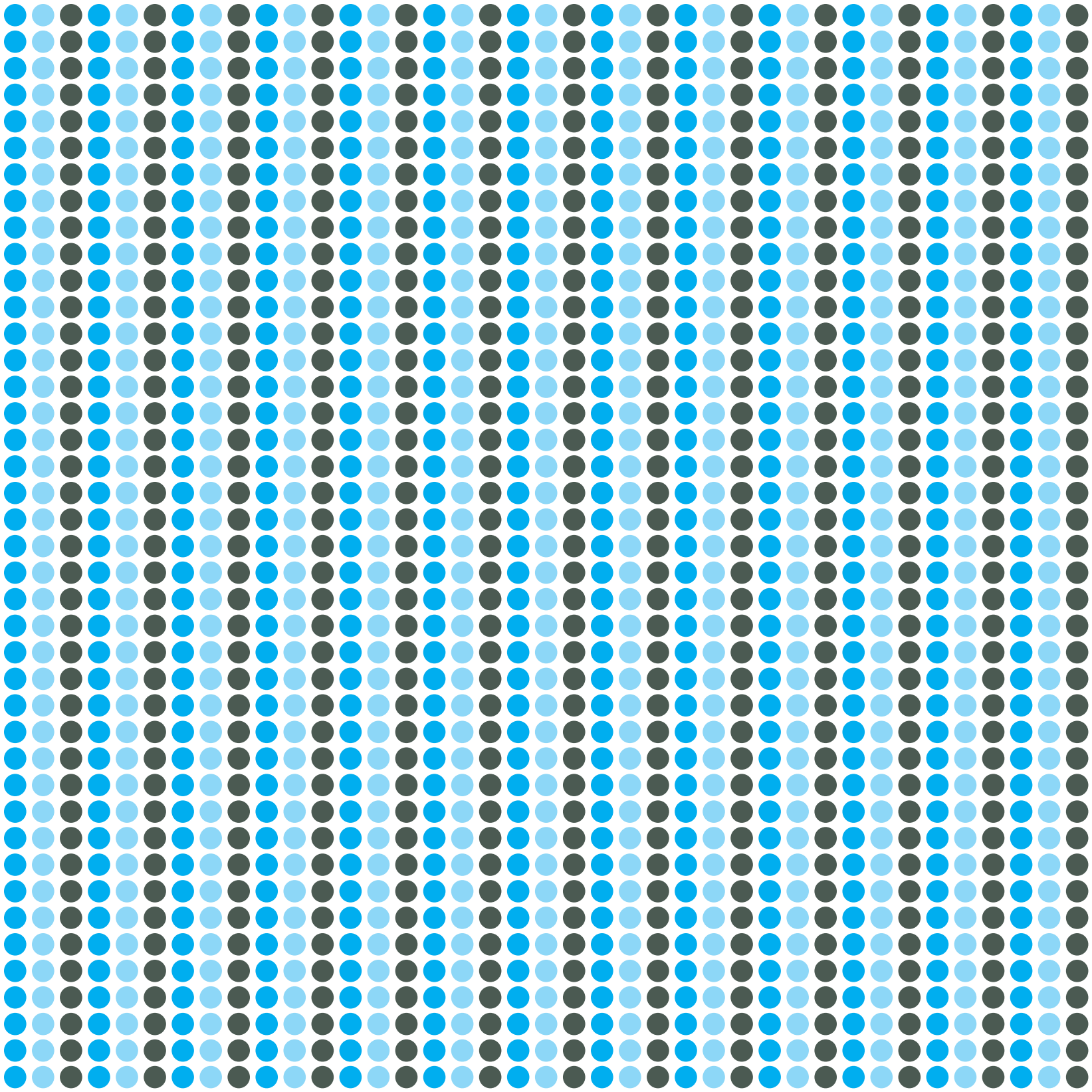
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LET THE SUN DO THE WORK

Analyzing the Economic and Environmental Performance of Residential PV-Battery Systems in Massachusetts

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PV-BATTERY SYSTEMS OFFER A VIABLE TECHNOLOGICAL ALTERNATIVE TO INTERMITTENT, STAND-ALONE PV SYSTEMS. WHEN DEPLOYED AT THE RESIDENTIAL LEVEL, PV-BATTERY SYSTEMS ALLOW HOUSEHOLDS TO SIGNIFICANTLY REDUCE THEIR RELIANCE ON THE ELECTRIC GRID BY STORING EXCESS ELECTRICITY GENERATED FROM THEIR SOLAR PANELS FOR SELF-CONSUMPTION. THIS STUDY INVESTIGATES THE EXTENT TO WHICH RESIDENTIAL PV-BATTERY SYSTEMS OFFER ECONOMIC AND ENVIRONMENTAL BENEFITS TO MASSACHUSETTS HOMEOWNERS THROUGHOUT THEIR OPERATIONAL LIFETIME. USING SPREADSHEET MODELS, I REPRESENT THE ENERGY FLOWS, CASH FLOWS, AND GREENHOUSE GAS EMISSIONS ASSOCIATED WITH RESIDENTIAL PV-BATTERY SYSTEMS IN MASSACHUSETTS UNDER DIFFERENT ECONOMIC AND TECHNOLOGICAL ASSUMPTIONS. RESULTS INDICATE THAT THESE SYSTEMS ARE A VIABLE MEANS FOR HOMEOWNERS TO SAVE MONEY AND REDUCE THEIR CARBON FOOTPRINT. ECONOMIC PERFORMANCE OF RESIDENTIAL PV-BATTERY SYSTEMS IS DEEPLY IMPACTED BY FEDERAL AND STATE SUBSIDIES, AS WELL AS NET METERING OFFERINGS AND ELECTRICITY RATE STRUCTURES. SYSTEM SIZE ALSO OFFERS CERTAIN TRADEOFFS BETWEEN ECONOMIC AND ENVIRONMENTAL PERFORMANCE.

I. INTRODUCTION

According to the "U.S. Solar Market Insight – 2019 Year in Review", produced by Wood Mackenzie and the Solar Energy Industries Association (SEIA), the U.S. saw record-setting residential solar capacity added in 2019, with more than 2.8 GW installed (SEIA & Wood Mackenzie, 2020). In states with high retail electricity rates and robust incentives, installing solar can help homeowners save money on their electric bills. Others choose to install solar as a means of reducing their carbon footprint, thus helping to mitigate climate change.

An important limiting factor of solar power is its inherent intermittency. Photovoltaic (PV) cells are only able to generate electricity when the sun is shining, and homeowners who install solar are only able to use electricity generated from their system during the daytime (EnergySage, 2018a). One potential solution to this problem is to integrate a large lithium-ion battery with the PV system. By storing excess electricity produced from the solar panels throughout the day, homeowners can continue using electricity generated from their PV system even when the sun is no longer shining (see Figure 1). This comes with a few added benefits to the homeowner and society at large.

Unlike standalone PV systems, PV-battery systems can provide households with backup power in case of an outage. This has been a crucial driver of growth in California's residential solar-plus-storage market, where last year's wildfires, and subsequent public-safety power shutoff events, left hundreds of thousands of utility customers without electricity (Lazo & Carlton, 2019; St.

John, 2020).

Residential PV-battery systems also have the potential to offer system-level benefits that improve the overall efficiency of the electric grid and reduce system-level costs. These benefits include the ability to offset generation from more expensive peaking units, reduce congestion on transmission and distribution lines, stabilize local electricity flows, control local voltage fluctuations, and defer transmission and distribution system upgrades. Electricity storage is critical for realizing these benefits and without it, high penetration of distributed solar may actually increase, not decrease, costs (Shlatz, Buch & Chan, 2013).

This analysis focuses on the use of PV-battery systems within Massachusetts from 2020-2050, a state that already offers robust incentives for its residential solar market. In addition to offering net metering at the full retail electricity rate, the state's Solar Massachusetts Renewable Target (SMART) Program requires utilities to pay solar owners for every kWh of electricity their PV system produces monthly. The SMART program also offers higher incentive payment rates to PV systems that include some form of energy storage (MassCEC, 2019).

This research will help to quantify the economic and environmental benefits accrued to households that install PV-battery systems in the state of Massachusetts. It will also shed light on the most important variables in determining this performance, allowing electricity consumers, policymakers, and utilities to make informed decisions on how to deploy the technology most effectively.
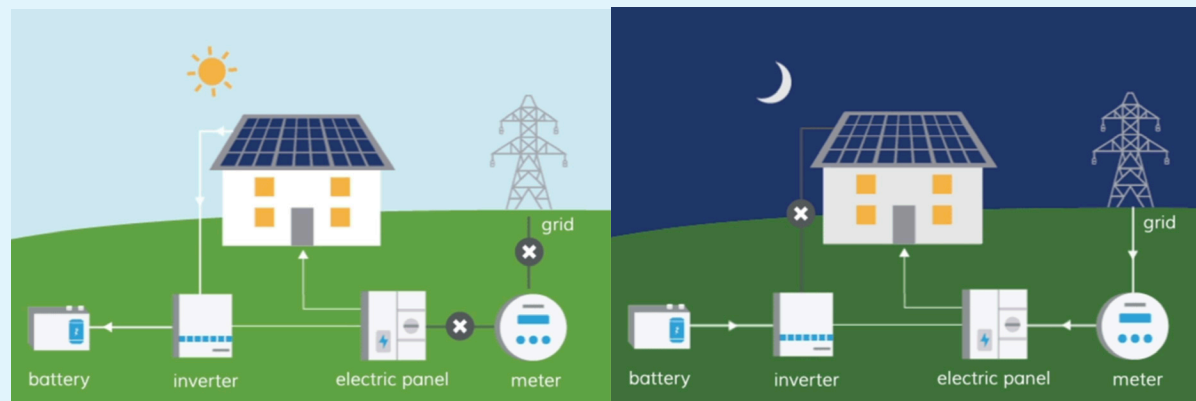

FIGURE 1: A VISUAL REPRESENTATION OF HOW PV-BATTERY SYSTEMS OPERATE DURING THE DAY VERSUS THE NIGHT (ENERGYSAGE, 2019)

2. LITERATURE REVIEW
2.1 Overview
Due to the nature of the article length in this journal, the Literature Review for this paper was removed to concentrate on the experiment and its conclusion.

This literature review highlights the current state of knowledge on PV-battery systems with a focus on studies that aimed to model the performance of these systems in a residential setting. Key findings from the literature review can be summarized as follows:

PV-battery systems have been extensively studied to quantify the benefits of deploying such systems at the residential level. Early research tended to focus on the application of these systems in countries that pioneered favorable policies for distributed generation. This often involved the simulation and optimization of residential PV-battery systems based on existing feed-in tariff (FiT) incentives and net metering programs. Most studies accounted for a similar variety of economic and technical parameters but used different model designs and assumptions to simulate energy flows and cash flows. Although many studies acknowledged the potential environmental benefits of increasing self-consumption of solar-generated electricity with a battery, few quantified those benefits.

3. METHODS
3.1 Research Questions
To quantify the economic and environmental performance of residential PV-battery systems in the state of Massachusetts, I created the following models to represent the operation of these systems on one-year and 30-year time scales:

- How effective are residential PV-battery systems at reducing a household's reliance on the electric grid?

- What is the expected payback period for a residential PV-battery system and how do government subsidies and net metering policies affect this timeline?

- How effective are residential PV-battery systems at mitigating GHG emissions throughout their lifetime?

- How does system size impact the economic performance of residential PV-battery systems?

For most of the questions, I additionally look at how standalone PV systems would perform in comparison as a technology alternative.

3.2 Model Descriptions
3.2.1 Overview
This section describes the models created for this study to represent the energy flows, cash flows, and GHG emissions associated with residential PV-battery systems in Massachusetts.

The "Year One Energy Flows" model quantifies a household's hourly energy flows over a year under three scenarios that use the same annual hourly electricity consumption profile: *Baseline* scenario represents a household with neither solar panels, nor battery system, *Standalone PV* scenario represents a household with solar panels, but no battery system, and *PV-battery* scenario represents a household with both solar panels and an integrated battery system. The *Standalone PV* and *PV-battery* scenarios pair the consumption profile with an annual hourly PV generation profile, then use a series of conditional statements to represent how each technology influences hourly energy flows.

The "Lifetime NPV" model calculates the NPV of both a standalone PV system and a PV-battery system in Massachusetts over 30 year. The year one calculation of NPV factors in outputs from the "Year One Energy Flows" model, the amount of electricity consumed on-site from the standalone PV or PV-battery systems, and the amount of electricity sent back to the grid for net metering. For subsequent years, deflationary pressure is applied to those values to reflect technological degradation. Retail electricity prices, net metering prices, and SMART incentive payment rates interact with these technological parameters to determine the annual revenues generated by the Standalone PV and PV-battery systems. Capital costs and operating and maintenance (O&M) costs associated with each technology are calculated as a function of system size and years in operation. After taking the difference between total system costs and revenues, a discount rate is applied to factor in the time value of money.

The "Lifetime Net Emissions" model calculates net GHG emissions from using a standalone PV system or a PV-battery system in a residential setting over a 30-year period. Net emissions are calculated by taking the difference between avoided emissions from using the standalone PV

or PV-battery system, and the life cycle emissions associated with the technology itself. Avoided emissions factor in the amount of electricity consumed on-site from the standalone PV or PV-battery system over a 30-year period, a value drawn directly from the "Lifetime NPV" model. Lifetime emissions data for each technology are based on estimates from relevant academic papers and industry reports.

3.2.2 Year One Energy Flows
3.2.2.1 Baseline
In a household with neither solar panels nor energy storage system, all electricity demand is supplied directly from the grid:

$$E_{FromGrid_h} = E_{Load_h}$$

where $E_{FromGrid_h}$ refers to electricity drawn from the grid during hour h, and E_{Load_h} refers to household electricity consumption during that same hour.

3.2.2.2 Standalone PV
This scenario represents the same household after installing a PV system without an associated battery storage system. The household's hourly demands for electricity from the grid are calculated using the following conditional statements:

$$E_{FromGrid_h} = \begin{cases} E_{Load_h} - E_{FromPV_h}, & E_{Load_h} > E_{FromPV_h} \\ 0, & E_{Load_h} \leq E_{FromPV_h} \end{cases}$$

where E_{FromPV_h} refers to electricity generated from the solar panels during hour h. Since Massachusetts utilities offer net metering credits to residential customers who send electricity to the grid, any excess electricity generated from the PV system must be accounted for:

$$E_{ToGrid_h} = \begin{cases} E_{FromPV} - E_{Load_h}, & E_{Load_h} < E_{FromPV_h} \\ 0, & E_{Load_h} \geq E_{FromPV_h} \end{cases}$$

where E_{ToGrid_h} represents electricity sent to the grid for net metering credits during hour h.

3.2.2.3 PV-Battery
In a household with both solar panels and an integrated battery, hourly demand for electricity from the grid is calculated using the following algorithm:

$$E_{FromGrid_h} =$$

$$\begin{cases} E_{Load_h} - E_{FromPV_h} - B_{charge_h}, & E_{Load_h} - E_{FromPV_h} - B_{charge_h} > 0 \\ 0, & E_{Load_h} - E_{FromPV_h} - B_{charge_h} \leq 0 \end{cases}$$

where B_{charge_h} is the battery's level of charge at the end of hour h. The battery is charged and discharged in such a way as to maximize self-consumption. Figure 2 shows the decision tree that defines this process. Although, once the battery is fully charged, excess electricity is not merely "lost". Instead, it is sent to the grid for net metering.
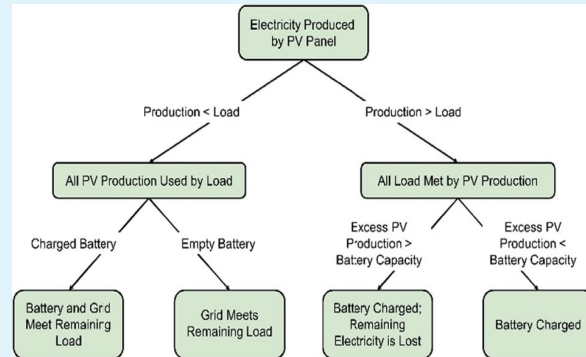
If the solar panels generate excess power $(E_{Load_h} < E_{FromPV_h})$, that electricity first goes to charge the battery. If the battery is full, any excess electricity is sent to the grid for net metering credits:

$$B_{charge_h} =$$

$$\begin{cases} B_{charge_{h-1}} + \eta_{bat}(E_{FromPV} - E_{load}), & B_{charge_{h-1}} + (E_{FromPV_h} - E_{Load_h}) < B_{max} \\ B_{max}, & B_{charge_{h-1}} + (E_{FromPV_h} - E_{Load_h}) \geq B_{max} \end{cases}$$

$$E_{ToGrid_h} =$$

$$\begin{cases} B_{charge_{h-1}} + (E_{FromPV} - E_{Load_h} - B_{max}), & B_{charge_{h-1}} + (E_{FromPV_h} - E_{Load_h}) > B_{max} \\ 0, & B_{charge_{h-1}} + (E_{FromPV_h} - E_{Load_h}) \leq B_{max} \end{cases}$$

where $B_{charge_{h-1}}$ is the charge of the battery at the beginning of the hour, B_{max} is the battery's maximum capacity, and bat is the roundtrip efficiency of the battery.

If load exceeds PV production $(E_{Load_h} > E_{FromPV_h})$, the battery is discharged until either the excess load is met, or the battery reaches its minimum capacity:

$$B_{charge_h} =$$

$$\begin{cases} B_{charge_{h-1}} - (E_{Load_h} - E_{FromPV_h}), & (E_{Load_h} - E_{FromPV_h}) < B_{charge_{h-1}} \\ B_{min}, & (E_{Load_h} - E_{FromPV_h}) > B_{charge_{h-1}} \end{cases}$$

where B_{min} is the minimum capacity of the battery. In this case, no electricity is sent to the grid for net metering.

3.2.3 Lifetime NPV
3.2.3.1 Standalone PV
The NPV of a grid-connected residential PV system after n years of operation is a function of the different costs and revenues it accumulates during those years. In Massachusetts, sources of revenue for these systems include avoided costs of electricity, incentive payments offered by the SMART program, and net metering credits:

$$Revenues_n =$$

$$(E_{FromPV_n} \times P_{retail_n}) + (S_{SMART_n} \times [E_{PV_n}]) + (E_{ToGrid_n} \times P_{netmeter_n})$$

where P_{retail_n} is the retail price of electricity sold from the grid, S_{SMART_n} is the SMART program incentive payment rate, is the total amount of electricity produced by the PV system, and E_{PV_n} is the price of electricity sold back to the grid, all in the nth year of operation. Costs for these systems include capital costs and operating and maintenance costs:

$$Costs_n = I_{PV_n} + OM_{PV_n}$$

where I_{PV_n} refers to the capital costs of the PV system, a function of system size, and OM_{PV_n} refers to the operating and maintenance costs, a function of system size and years in operation.

The NPV of the PV system is calculated as the difference between system costs and revenues that have accumulated after n years of operation, factoring in the time value of money:

$$NPV = \frac{\sum_{n=1}^{y} Revenues - \sum_{n=1}^{y} Costs}{(1+r)^n}$$

where y is the system lifetime in years, and r is the discount rate.

3.2.3.2 PV-Battery
The same aforementioned formulas are applied when calculating the NPV of the PV-battery system. The difference is that the battery adds an additional source of costs and revenues. Additional revenues come from an increase in avoided electricity costs:

$$Revenues_n =$$

$$(E_{FromPV_n} + E_{FromBattery_n}) \times P_{retail_n} + (S_{SMART_n} \times E_{PV_n}) + (E_{ToGrid_n} \times P_{wholesale_n})$$

where $E_{FromBattery_n}$ is electricity supplied directly to the

household from the battery in year n. Additional costs in this scenario come from the capital costs of the battery system, and its operating and maintenance costs over time:

$$Costs_n = I_{PV_n} + I_{battery_n} + OM_{PV_n} + OM_{battery_n}$$

where $I_{battery_n}$ equals the battery's capital costs, and $OM_{battery_n}$ equals the battery's operation and maintenance costs in year n of operation.

3.2.4 Lifetime Net Emissions
3.2.4.1 Standalone PV
The net GHG emissions for the Standalone PV scenario are calculated by taking the difference between the technology's expected lifetime emissions, and the emissions that would have been produced by the grid up until year n if the technology not been used at all. The system lifetime in years, referred to as y, acts as the upper limit for n.

$$Lifetime\ Net\ Emissions = \sum_{n=1}^{y} Emissions_{avoided_n} - Emissions_{lifetime_n}$$

The following equation represents the avoided emissions for a residential PV system without a battery component:

$$Emissions_{avoided_n} = E_{FromPV_n} \times CI_{grid}$$

where CI_{grid} refers to the average emissions intensity of the grid in metric tons of CO2e/kWh. Lifetime emissions of the PV system are calculated as follows:

$$Emissions_{lifetime} = PV_{cap} \times CI_{PV}$$

where PV_{cap} is the nameplate capacity of the PV system, and CI_{PV} is the life cycle emissions of the technology per kW of capacity.

3.2.45.2 PV-Battery
Similar formulas to the ones mentioned above are applied when calculating the net GHG emissions of the PV-battery system. In this case, the battery adds an additional source of avoided emissions and lifetime emissions:

$$Emissions_{avoided} = (E_{FromPV_n} + E_{FromBattery_n}) \times CI_{grid}$$

$$Emissions_{lifetime} = (PV_{cap} \times CI_{PV}) + (B_{max} \times CI_{battery})$$

where $CI_{battery}$ refers to the life cycle emissions of the battery per kWh of capacity.

3.3 DATA SOURCES
3.3.1 Technological Input Parameters
3.1.1 Household Consumption Profile

The household consumption profile was sourced from the U.S. Department of Energy's OpenEI database. These data are calculated by the Office of Energy Efficiency and Renewable Energy (EERE) using residential building models and the EnergyPlus simulation software (Office of Energy Efficiency & Renewable Energy, n.d.). The profile predicts hourly electricity consumption for a household in Plymouth, MA, with an annual electricity demand of 8,853 kWh. This value was deemed reasonable given that the average New England household consumes 7,536 kWh of electricity per year (MassCEC, 2019). Figure 3 illustrates the average annual hourly load for the household consumption profile.

3.3.1.2 PV Generation Profile
The PV generation profile uses predicted values from the National Renewable Energy Laboratory's (NREL) PVWatts Calculator (National Renewable Energy Laboratory, 2016). The latitude and longitude of the profile are set to 41.97° N, 70.66° W, corresponding roughly to Plymouth, MA. The base case PV system size is set at 7 kW_{dc}, the average residential PV system size in Massachusetts (MassCEC, 2019). Other PV capacities tested in the analysis include a 3.5 kW_{dc} system and a 10.5 kW_{dc} system. The tool predicts AC system output in kilowatts for every hour of the year.

Technology specifications are set to standard modules in a fixed roof-mount array. The calculator assumes a 33° tilt angle since most homes in New England have roofs that are pitched at 33° or more to shed snow and ice (MassCEC, 2019). Ideally, a fixed roof-mounted PV array should be at an angle equal to the latitude of the location where it is installed to maximize exposure to sunlight over the year. However, adding tilt to a solar racking can increase installation costs and may lead to panels shading one another (EnergySage, 2018b).

Azimuth is set to 180°, implying a south-facing roof. A capacity factor of 15.3%, a

DC to AC size ratio of 1.2, and an inverter efficiency of 96% are all used based on the calculator's recommendations. Figure 4 shows the average annual hourly PV generation profiles for the three PV capacities tested in this analysis.

3.3.1.3 Battery Storage
For the PV-battery base case, a maximum storage capacity of 13.5 kWh is used to reflect the capacity of the Tesla Powerwall 2, a market-leading product in the U.S. residential battery market. This analysis also tests the performance of 6.75 kWh and 20.25 kWh batteries, representing a 50% change in capacity from the base case. The round-trip efficiency of the batteries is assumed to be 87%, slightly less than the 90% figure Tesla advertises to be conservative (Tesla, 2019).

3.3.1.4 Yearly Degradation Rate
Since the "Lifetime NPV" model requires measuring the
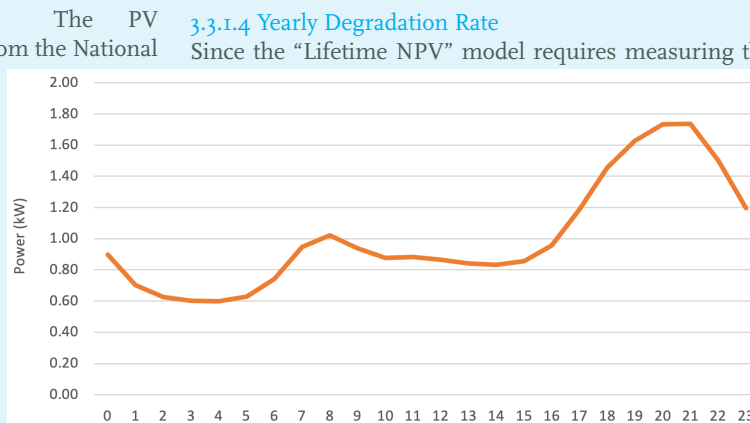
FIGURE 3: AVERAGE ANNUAL HOURLY ELECTRICITY CONSUMPTION PROFILE FOR A HOUSEHOLF IN PLYMOUTH, MA.
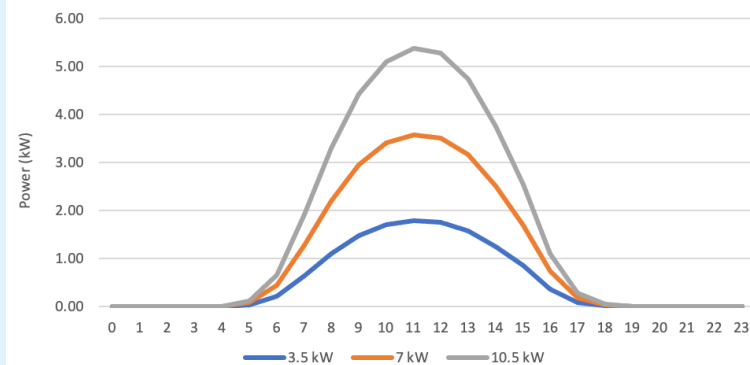
FIGURE 4: AVERAGE ANNUAL HOURLY GENERATION PROFILES PROJECTED FOR RESIDENTIAL PV SYSTEMS NEAR PLYMOUTH, MA.

value of these technologies over many years, it needs to account for losses of value due to technology degradation. Therefore, degradation rates are applied to both the PV and battery technologies. The PV degradation rate is based on an NREL study which found the median rate of degradation for solar panels to be 0.5% per year (Jordan & Kurtz, 2012).

Annual losses in maximum battery capacity and efficiency could either be a function of charge cycles or modeled using a fixed rate. I use a fixed rate derived from the 10-year warranty of Tesla's Powerwall 2 product. The warranty states that each Powerwall will retain 70% of its 13.5 kWh capacity, or 9.75 kWh, at 10 years following its initial installation date (Tesla, 2017). I use a 2% annual degradation rate, bringing the Powerwall's maximum capacity down to 11.26 kWh after 10 years.

3.3.2 Economic Input Parameters
3.3.2.1 Technology Costs
The capital cost of the PV system is assumed to be $2.84/$W_{dc}$ based on estimates for the national average residential system cost in the US before federal tax credits (SEIA, 2020). Operating and maintenance costs are based on the 2018 NREL O&M Cost Model which includes preventative maintenance, scheduled at regular intervals with costs increasing at an inflationary rate, and corrective maintenance to replace components. The model estimates annual O&M costs to be $22/kW_{dc}$ (Fu, et al., 2018).

The capital cost of the battery system is assumed to be $800/kWh. This is based on pricing for the Tesla Powerwall 2 and includes estimates for system cost, installation costs, and additional hardware costs (Sendy, 2020). Operating and maintenance costs reflect the costs of replacing the battery at the end of its 10-year lifetime.

A price deflation rate of 0.02% is applied to the battery's capital cost value each year to account for future price decreases for lithium-ion battery products. Under these conditions, battery costs are projected to drop to $667/kWh by 2030, $545/ kWh by 2040, and $445/kWh by 2050. No price deflation rate is needed for the solar panels since this analysis assumes they are only installed once.

3.3.2.2 Retail Electricity Price
According to the U.S. Energy Information Administration, the average price of electricity in 2020 for residential consumers in Massachusetts is $0.22/kWh (U.S. Energy

Information Administration, 2020). Prices are expected to increase in small increments over time given national trends in electricity rates over the past decade (U.S. Energy Information Administration, 2019). Therefore, a price inflation rate of 1% is applied annually.

3.3.2.3 Net Metering Price
Massachusetts utilities currently offer net metering credits to residential customers at the retail electricity rate. In this analysis, I test scenarios where net metering prices are either offered at 50% of retail electricity prices or not offered at all.

3.3.2.4 Government Subsidies
The federal ITC partly subsidizes capital costs for PV and PV-battery systems. In 2020, the federal ITC covers 26% of investment costs for both systems, so long as batteries are charged by the solar panels more than 75% of the time (National Renewable Energy Laboratory, 2017). Massachusetts also offers a personal income tax credit for 15% of total PV system capital costs, with a maximum credit of $1,000 (MassCEC, 2019). Both tax credits are applied to capital costs in the "Lifetime NPV" model.

Massachusetts' SMART Program offers incentive payments for a 10-year term to the owners of residential PV systems, with additional incentive payments provided to the owners of PV systems that integrate battery storage (MassCEC, 2019). A value of energy calculator is available on the program administrator's webpage to help calculate expected incentive payments based on solar capacity, storage capacity, and the duration of the storage. I used this calculator to find the appropriate 10-year incentive payments for various standalone PV and PV-battery system sizes tested in the "Lifetime NPV" model.

While the above mentioned subsidies all exist in reality, I decided to add one speculative subsidy into the "Lifetime NPV" model. If implemented, a carbon tax would increase the cost of electricity, thus incentivizing the use of standalone PV or PV-battery systems. Based on a 2015 study conducted by the Tax Policy Center, a $10/ton carbon tax would add about $0.05/kWh to the price of electricity generated from a typical fuel mix (Marron, et al., 2015). I account for a $40/ton carbon tax in 2035, which would cause retail electricity rates to increase by approximately $0.02/kWh from that year forward.

3.3.2.5 Discount Rate

Based on a review of previous studies, 4% is chosen as the nominal discount rate to be applied in the "Lifetime NPV" model (Hoppmann, et al., 2014).

3.3.3 Environmental Input Parameters
3.3.3.1 Life Cycle GHG Emissions

Through a meta-analysis of existing literature on PV life cycle assessments, Nian (2016) found the median value for the life cycle emissions of solar panels to be about 1,320 kg CO_2e/kW. Based on an extensive review of life cycle assessments for lithium-ion batteries, Peters et al. (2017) found the average value for the life cycle emissions of lithium-ion batteries to be 110 kg CO_2e/kWh. I apply each of these in the "Lifetime Net Emissions" model.

3.3.3.2 Grid Emissions Intensity (Annual)

Emissions data from ISO New England shows that its network's average GHG emission rate in 2017 was 682 lb. CO_2e /MWh (ISO New England, 2019a). This translates to 0.31 kg CO_2e/kWh and represents a 3.9% decrease from the 2016 average. Given the ambitious target set by New England states to reduce the region's GHG emissions by 80% from 1990 levels, we can expect this average to continue declining (Weiss et al., 2019). Therefore, I apply a 4% annual decrease in average emission rates for the "Lifetime Net Emissions" model.

4. RESULTS
4.1 Energy Flows
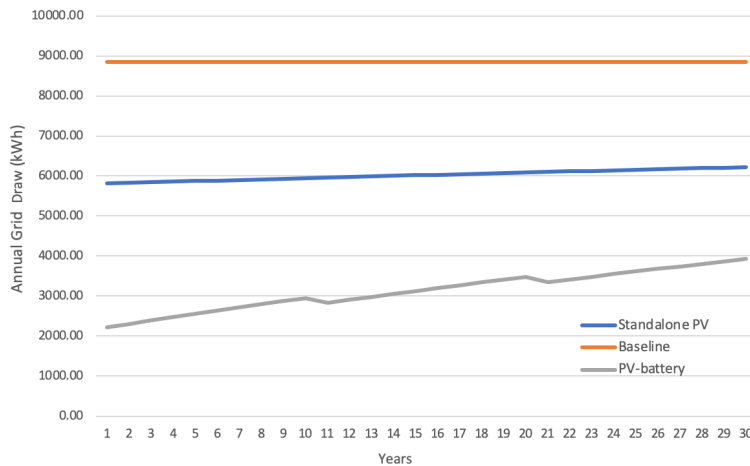
FIGURE 5: HOUSEHOLD GRID RELIANCE UNDER THE BASELIE, STANDALONE PV, AND PV-BATTERY SCENARIOS

Configuration	PV size (kW)	Battery size (kWh)	Self-Consumption (%)	
			Standalone PV	*PV-battery*
A	7	13.5	34	75
B	3.5	13.5	30	50
C	10.5	13.5	36	81
D	7	6.75	34	58
E	7	20.25	34	80

TABLE 1: SELF-CONSUMPTION LEVELS FOR VARIOUS PV-BATTERY SIZE CONFIGURATIONS

4.1.1 Comparing Standalone PV & PV-battery Systems

This analysis looks at how a Massachusetts household with an annual electricity load of 8,853 kWh can reduce reliance on the electric grid using standalone PV or PV-battery technologies. With neither of these systems installed, the grid supplies all of the household's electricity demands. After installing a 7 kW PV system, the household's annual grid draw drops to 5,811 kWh. By pairing a 13.5 kWh battery with the 7 kW PV system, annual grid draw drops to 2,216 kWh. It is useful to measure these differences in terms of self-consumption, or the percentage of total electricity consumption supplied on-site. In this case, the homeowner is able to meet 74% of total electricity consumption needs through self-consumption using a PV-battery system, compared to just 35% with solar panels and no battery. It is important to note that these values only represent each technology's first year of operation. Figure 5 demonstrates that grid reliance steadily increases in subsequent years as each technology degrades. Small dips in annual grid draw for the *PV-battery* scenario occur every 10 years when the battery is replaced, reflecting the gains in efficiency with a newly installed battery.

4.1.2 Effects of System Size

Through testing alternative size configurations for Standalone PV and PV-battery systems in the "Year One Energy Flows" model, we see different levels of self-consumption associated with each configuration for the first year of operation (see Table 1).

As represented by configurations B and C, changes in PV capacity have very little impact on self-consumption under any Standalone PV scenario. In these cases,

the maximum difference in self-consumption resulting from a 50% change in PV capacity is just four percentage points. On the other hand, decreasing PV capacity has notable effects on self-consumption under the *PV-battery* scenario. Self-consumption levels for Configuration B are 25 percentage points lower than those of configuration A.

A 50% increase in battery capacity (upgrading configuration A to configuration E) only results in a five-percentage point increase in self-consumption. Decreasing battery capacity to 6.75 results in a 17 percentage point decrease in self-consumption which, although significant, is still less than the changes seen when the same amount decreases PV capacity.

Figures 6, 7, and 8 further illustrate how differences in battery size impact the energy flows of PV-battery systems. By contrasting the average annual hourly energy flows of configurations A, D, and E in their first year of operation, we can visualize differences in battery discharge, grid draw, and net metering. Amongst the three systems, configuration D demands the most electricity from the grid, and sends the most electricity back to the grid for net metering. Configuration E can continuously discharge electricity from its battery for long periods, and only demands small amounts of electricity from the grid throughout the night. Configuration A typically operates somewhere in between these two extremes.

4.2 CASH FLOWS
4.2.1 Comparing Standalone PV & PV-battery Systems
When making any large financial investment, one important consideration is the amount of time it will take for the investment to become profitable. Given that residential solar and solar-plus-storage installations can cost tens of thousands of dollars, homeowners would greatly benefit from knowing

each technology's expected payback period. In this analysis, I calculate the expected payback period for PV and PV-battery systems in Massachusetts by determining when their NPV becomes positive in the "Lifetime NPV" model. Results show that after just five years, the base case standalone PV system attains a positive NPV, compared with the PV-battery system, which takes seven years to
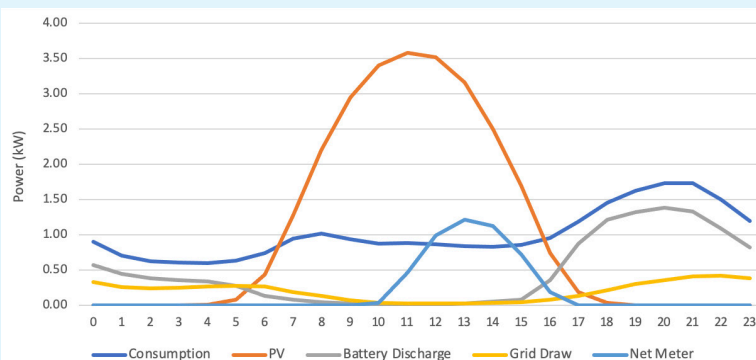
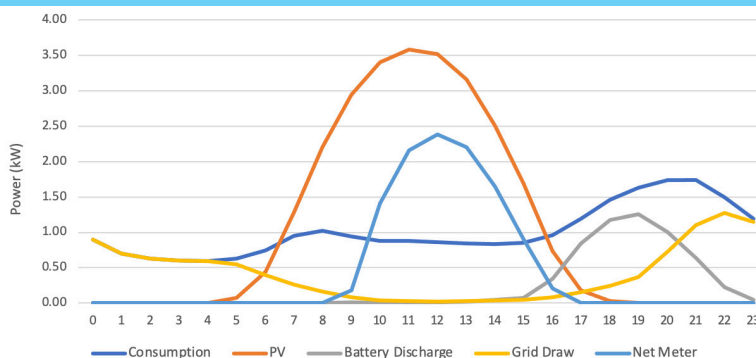**FIGURE 6. AVERAGE ANNUAL HOURLY ENERGY FLOWS (CONFIGURATION A).**

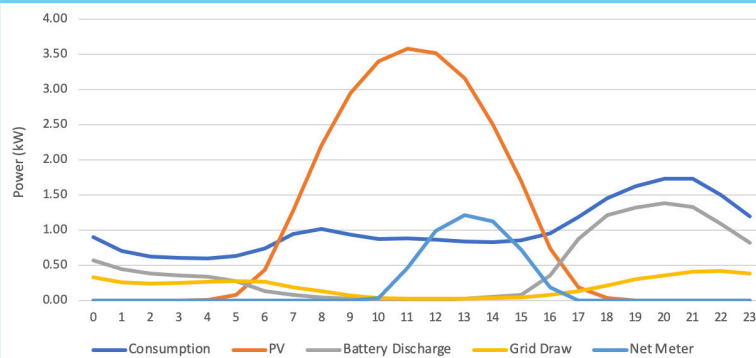**FIGURE 7. AVERAGE ANNUAL HOURLY ENERGY FLOWS (CONFIGURATION D).**

FIGURE 8. AVERAGE ANNUAL HOURLY ENERGY FLOWS (CONFIGURATION E).
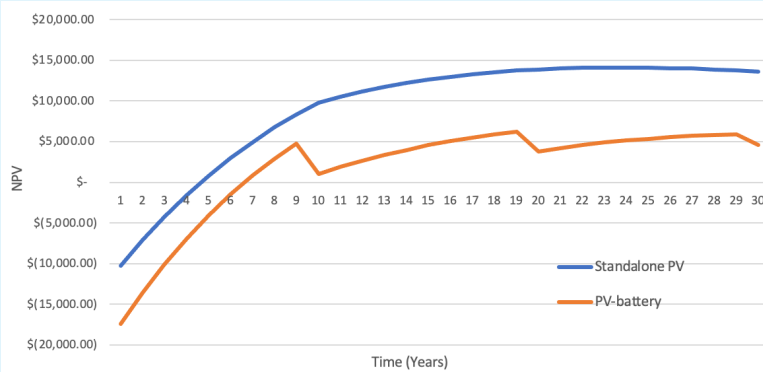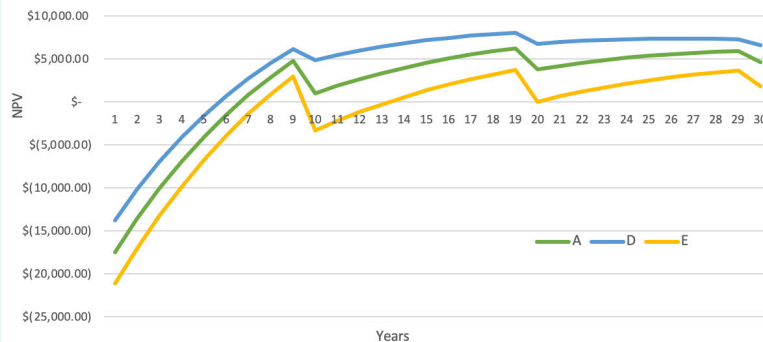
FIGURE 9. NPV FOR A STANDALONE PV SYSTEM AND PV-BATTERY SYSTEM.

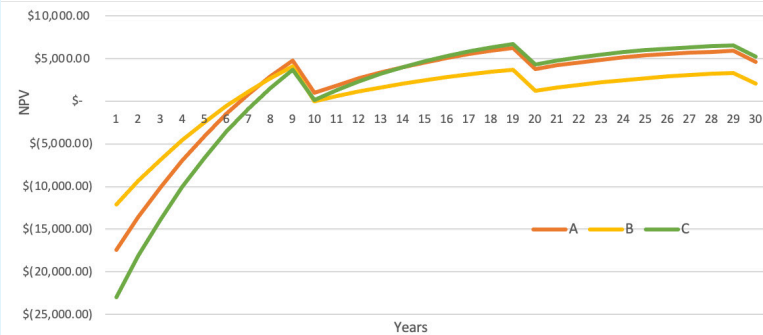**FIGURE 10. EFFECTS OF BATTERY CAPACITY ON PV-BATTERY NPV.**

FIGURE 11. EFFECTS OF PV CAPACITY ON PV-BATTERY NPV.

could be offset by losses in efficiency and maximum capacity as the battery continues to degrade. There may also be added safety risks when using large lithium-ion batteries past their lifetime.

4.2.2 Effects of System Size

When deciding whether to install a residential PV-battery system, homeowners should always consider a variety of system sizes to determine which may best suit their needs. In this analysis, I examine how the PV-battery size configurations listed in Table 1 compare in economic performance over a 30-year period. First, I measured differences in payback period between configurations A, D, and E, all of which share a 7 kW PV capacity but differ in battery size.

Figure 10 shows that configuration D, which has the smallest battery capacity, also has the shortest payback period. Although configuration E only has a slightly longer payback period than configurations A and D, replacing the battery after 10 years incurs high maintenance costs. Aside from higher replacement costs, other factors associated with battery size also contribute to differences in NPV over each configuration's lifetime. For example, larger batteries influence system revenues by increasing avoided electricity costs and, simultaneously, decreasing net metering revenues. The profitability of this tradeoff depends on factors such as the household's electricity consumption profile, net metering rates, and PV capacity.

break even. With higher capital costs at the outset of the study period, the PV-battery system's NPV experiences multiple dips throughout the 30-year period (see Figure 9). These dips can be attributed to the high costs of replacing the battery at the end of its lifetime which, in this analysis, is every 10 years. Homeowners may be able to continue using their battery past its intended lifetime. However, cost savings from not purchasing a replacement

Additionally, SMART incentive payments are partly influenced by battery capacity since the program's "Energy Storage Adder" is based on the ratio of PV capacity to battery capacity. As battery capacity increases relative to PV capacity, incentive payment rates increase, although the difference is quite small and payments only last for the first 10 years of operation.

Configuration	PV size (kW)	Battery size (kWh)	Payback Period (Years)	Maximum NPV
A	7	13.5	7	$6,230.82
B	3.5	13.5	7	$4,121.10
C	10.5	13.5	8	$6,704.74
D	7	6.75	6	$8,023.87
E	7	20.25	8	$3,688.56

TABLE 2. PAYBACK PERIOD AND MAXIMUM NPV FOR DIFFERENT PV-BATTERY SIZE CONFIGURATIONS.

I then repeated this process with configurations A, B, and C, all of which have a battery capacity of 13.5 kWh but differ in PV capacity. Although the changes in PV capacity do little to affect the payback period, the long-term effects on NPV are significant. Figure 11 shows that after 15 years of operation, configuration C surpasses configurations A and B in NPV. Interestingly, configuration B reaches its peak NPV in year nine, but fails to recover that value throughout the rest of its operational lifetime.

The payback period and maximum NPV for all of the PV-battery configurations mentioned above are summarized in Table 2. It becomes clear that configuration D has the best economic performance of all the PV-battery systems modeled in this analysis, both in terms of payback period and maximum NPV.

4.2.3 Effects of Government Subsidies

It remains to be seen whether residential solar-plus-storage markets can survive without the support of robust government incentives. By omitting certain subsidies from the "Lifetime NPV" model, I was able to visualize their effects on the expected payback of residential PV-battery systems in Massachusetts more clearly. For a 7 kW PV system paired with a 13.5 kWh battery (configuration A), certain subsidies have a significantly greater effect on NPV then others. The system's NPV fails to break even throughout the 30-year study period without any government subsidies. The Federal ITC

plays an important role in improving the economics of the system by reducing initial investment costs. However, federal subsidies alone only bring the payback period down to 25 years. Figure 12 shows that Massachusetts' SMART program has the greatest effect on payback time out of any subsidy by substantially increasing system revenues throughout operation. Combining the Federal ITC and SMART incentive payments ultimately reduces the expected payback time to just seven years. Interestingly, implementing a $40/ton carbon tax in 2035, which would theoretically increase retail electricity prices, does virtually nothing to increase NPV in the following years.

4.2.4 Effects of Net Metering

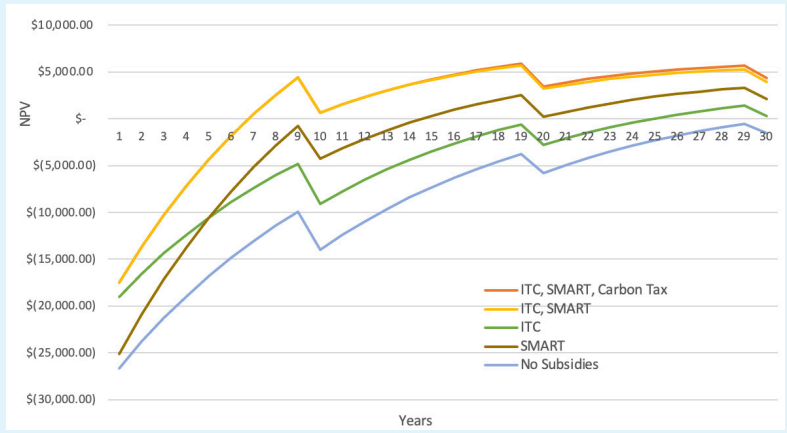Net metering has been proven to add significant value to

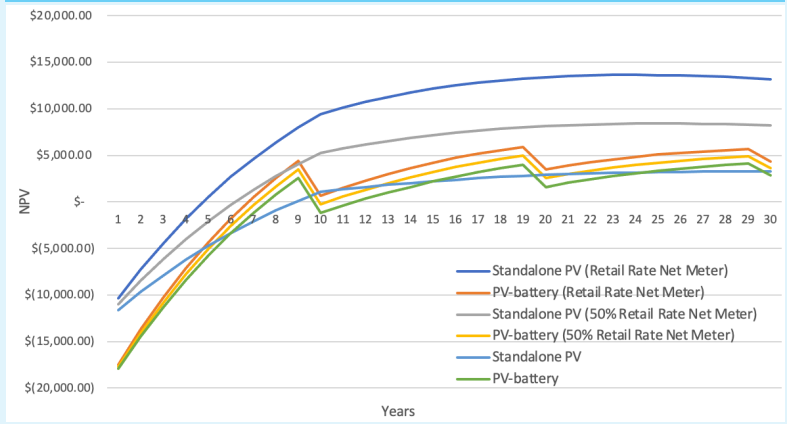**FIGURE 12. EFFECTS OF DIFFERENT GOVERNMENT SUBSIDIES ON PV-BATTERY NPV.**

FIGURE 13. EFFECTS OF DIFFERENT NET METERING PRICES ON STANDALONE PV & PV-BATTERY NPV.
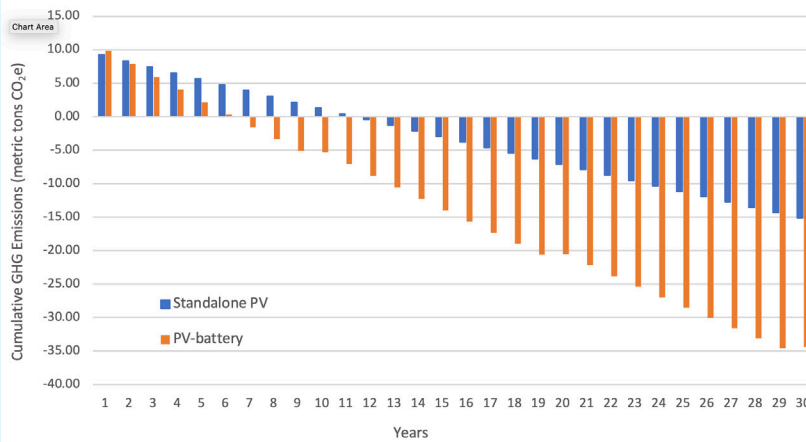
FIGURE 14. CUMULATIVE GHG EMISSIONS FOR STANDALONE PV AND PV-BATTERY SYSTEMS OVER A 30-YEAR PERIOD.

system begins its lifetime with higher net emissions than the standalone PV system. This is due to the emissions that come with the production of the battery. However, as the PV-battery system continues through its operational lifetime, net emissions drop at a rapid pace unmatched by the standalone PV system. This can be attributed to the PV-battery system's enhanced ability to offset fossil fuel generation from the grid in favor of clean energy produced on-site. Replacing the battery every 10 years has little impact on offsetting these gains in emissions abatement.

It should be noted that this analysis assumes every kWh of electricity consumed from the grid results in the same amount of GHG emissions, regardless of the time of day or season. In reality, the emissions intensity of the electric grid changes hour by hour throughout the year.

5. DISCUSSION

Residential PV-battery systems have been proposed as a way for homeowners to reduce their reliance on the grid by storing excess power produced from their solar array for self-consumption. My analysis supports this claim, showing that PV-battery systems could increase a typical Massachusetts household's self-consumption percentage between 50% and 81%. In comparison, the standalone PV systems modeled in this study could only increase the same household's self-consumption percentage to a maximum of 36%. Although PV-battery configurations A, C, and E support self-consumption levels at or above 75%, this does not necessarily imply that the household in question could disconnect from the grid and meet its electricity needs for three quarters of the year. I cannot make this assertion because this model focuses on a battery's ability to meet a household's hourly energy demands without accounting for peaks in power usage. Low maximum power output is a common characteristic of lithium-ion batteries and, without the support of the grid, home battery systems may only be able to power a few small appliances at a time. This has long been one of the major weaknesses of residential PV-battery systems considering that many homeowners install these systems with hopes of disconnecting from the grid, or having total

residential PV systems over time when offered at the full retail rate. In this analysis, I attempted to quantify that value by modeling scenarios where net metering is offered at a reduced rate, or not offered at all. I then looked at how these same changes would affect the economic performance of a PV-battery system. My findings suggest that reducing net metering rates by 50% raises the payback time of a standalone 7 kW PV system from five years to seven years, and eliminating net metering extends that payback period to nine years. Figure 13 shows just how little these changes affect PV-battery systems in comparison. Lowering the net metering rate by 50% only extends the payback period of the base case PV-battery system to eight years. After eliminating net metering, the payback period remains below nine years, shorter than the time needed to pay back the standalone PV system under the same circumstances. These findings reveal just how dependent standalone PV systems are on net metering revenues for economic viability. The expected payback period for PV-battery systems is barely impacted by these revenues.

4.3 GHG Emissions
4.3.1 Comparing Standalone PV and PV-battery Systems
In this study, I modeled the net GHG emissions associated with standalone PV systems and PV-battery systems over 30 years. My results indicate that the base case standalone PV system ends its 30-year lifetime with a net emissions value of -15.09 metric tons of CO2e while the base case PV-battery system has a net emissions value of -34.36 metric tons of CO2e. Figure 14 shows that the PV-battery

backup power in an outage (Cinnamon, 2019). Additionally, the household consumption profile used in this analysis does not represent all Massachusetts households. Future analysis should attempt to uncover how high and low estimates for household electricity consumption affect grid reliance and optimal system sizing.

Looking at Table 1, it is not surprising that the PV-battery configurations with the highest PV capacity and battery capacity, configurations C and E, respectively, also support the highest levels of self-consumption. However, in economic terms, these high-capacity systems do not perform as well as other configurations. In fact, Table 2 shows that configurations C and E have the longest payback periods of all the PV-battery configurations. The shortest payback period and maximum NPV belong to configuration D, a PV-battery system consisting of a 7 kW PV array and a 6.75 kWh battery. This enhanced performance is primarily driven by decreased capital costs and O&M costs associated with the smaller battery. One major shortcoming of the "Lifetime NPV" model is the assumption that capital costs for these technologies can be covered upfront without outside financing. While some homeowners may be able to afford these high upfront costs, many would struggle to afford them without a loan. Ideally, this analysis would be repeated for different financing scenarios. One innovative idea piloted in parts of the U.S. is to have utilities lease PV-battery systems to their customers for a monthly fee. Having access to thousands of customers' batteries would enable utilities to draw power when needed most, shaving peak demand and reducing peak system usage charges. For Green Mountain Power, Vermont's largest electric utility, this program resulted in increased reliability and lower overall costs for ratepayers (Mingle, 2019). In return, customers get to enjoy the benefits of their PV-battery system, without the high upfront costs, on the condition that they surrender control over their batteries during peak events which can occur several times a month for hours at a time.

The "Lifetime NPV" model makes it very clear that government subsidies still play a crucial role in supporting the economic viability of PV battery systems in Massachusetts. Without the federal ITC, the payback period for a 7 kW solar array paired with a 13.5 kWh battery jumps from seven to 15 years. By cutting Massachusetts' SMART incentive program on top of this, the same system fails to break even throughout its operational lifetime. Given that the federal ITC is set to phase out entirely for residential installations by 2022, Massachusetts

policymakers may want to consider scaling up the state's personal income tax credit in compensation. On April 15, 2020, the Massachusetts Department of Energy Resources and Governor Charlie Baker's office released emergency regulations doubling the size of the SMART program, bringing the program's total capacity to 3.2 GW (Sylvia, 2020). With specific carve-outs for smaller projects, any new standalone PV or PV-battery installations will likely qualify for incentive payments in the near future.

Another key takeaway from the "Lifetime NPV" model is the impact of net metering on the economic performance of PV-battery systems in the state of Massachusetts. When offered at the full retail electricity rate, net metering seems to do more to hurt residential solar-plus-storage markets than to help them. Under these circumstances, it is much more profitable for homeowners to install standalone PV systems than installing PV-battery systems because any excess electricity they produce can quickly be sold back to the grid. Alternatively, if utilities were to forgo net metering entirely, owners of standalone PV systems would not be compensated for any of the excess electricity they produce. Therefore, storing the electricity in a battery for eventual self-consumption would become the only way solar owners can extract value from their excess electricity generation. This represents significant upside for residential solar-plus-storage markets, seeing that electric utilities across the nation are beginning to reconsider net metering offerings because of the way these programs shift costs to customers without solar (Trabish, 2019b).

Regarding environmental performance, my findings suggest that PV-battery systems have net negative GHG emissions and outperform standalone PV systems in cumulative lifetime net emissions. Compared to solar panels, the production of lithium-ion batteries contributes very little to net emissions. By offsetting a greater amount of electricity production from the grid, the base case PV-battery system helped abate 24.18 more metric tons of CO_2e than the standalone PV system after 30 years of operation.

It should be noted that this analysis only accounts for one particular measure of environmental performance. While net GHG emissions are certainly an important metric to consider, other environmental impact measures such as resource use and toxicity also deserve consideration.

6. CONCLUSION

Residential PV-battery systems have the potential to reduce homeowners' reliance on the electric grid, helping them to save money and lessen their carbon footprint. This study was designed to measure how well PV-battery systems achieve those objectives in the state of Massachusetts under various economic and technological assumptions. Using several spreadsheet models to represent the energy flows, cash flows, and GHG emissions of PV-battery systems, I was able to produce the following insights:

- Residential PV-battery systems are already a viable means for Massachusetts homeowners to reduce grid reliance, lower their electricity costs, and offset GHG emissions.

- Out of the six PV-battery system sizes considered, no one configuration stood out as the top performer across all categories of performance. For reducing grid reliance, PV-battery systems with high solar capacity are the best option. In terms of saving money and seeing those returns quickly, PV-battery systems with small batteries offer the most value.

- Government subsidies will continue to play a crucial role in supporting the economic viability of PV-battery systems in Massachusetts, especially the state's SMART program, which substantially increases system revenues throughout operation. If the federal ITC expires in 2022 as planned, the expected payback period for these systems will more than double.

- Net metering as it is currently offered in Massachusetts incentivizes the adoption of standalone PV systems considerably more than PV-battery systems. In cases where net metering credits are not offered to electricity customers, the payback period for PV-battery systems becomes slightly shorter than that of standalone PV systems.

Further research on this topic would benefit from analyzing a wider variety of household electricity consumption profiles, financing scenarios, modes of operation for home battery systems, and metrics of environmental performance. Additionally, increased penetration of residential PV-battery systems in society will demand more in-depth research on how these technologies impact day-to-day grid operations.

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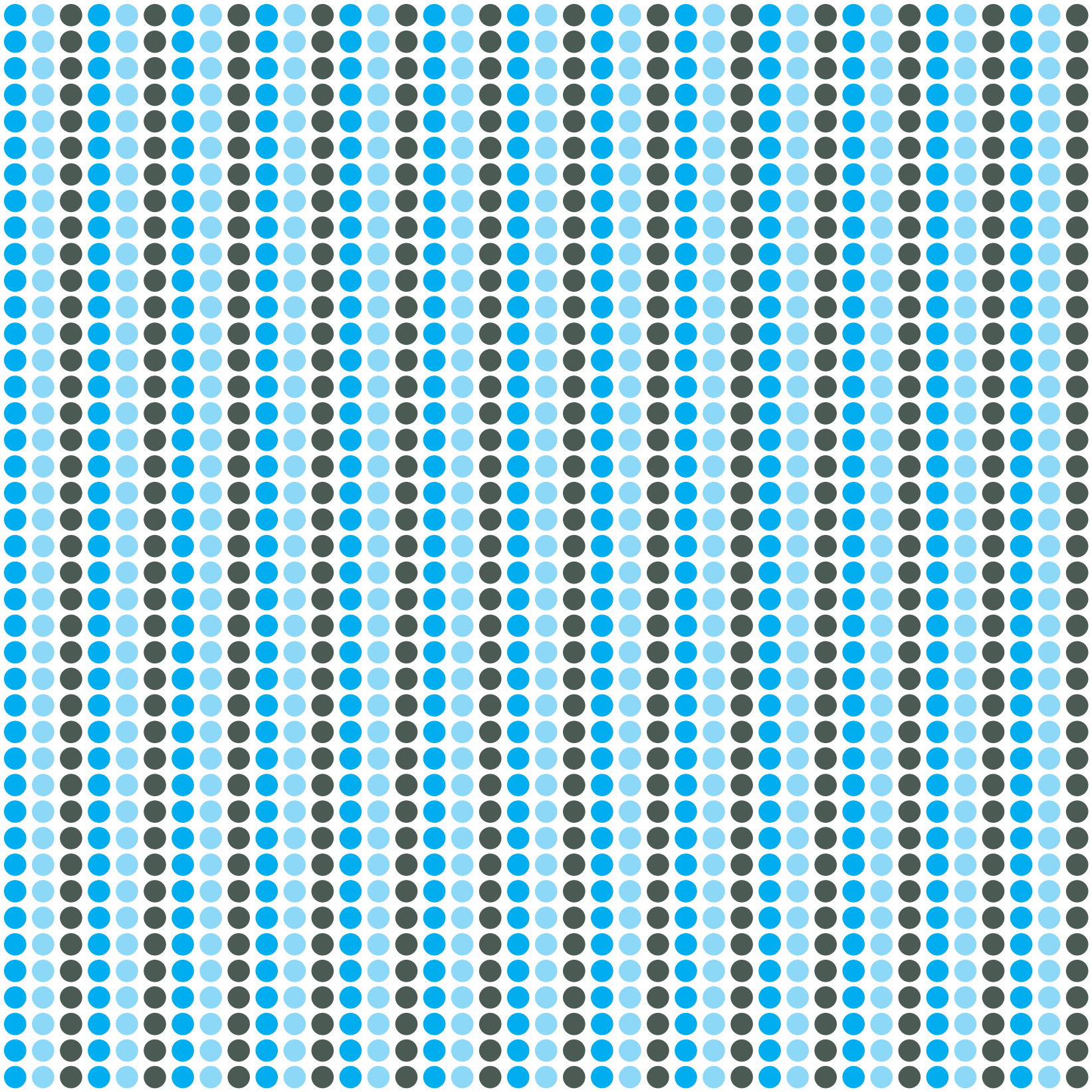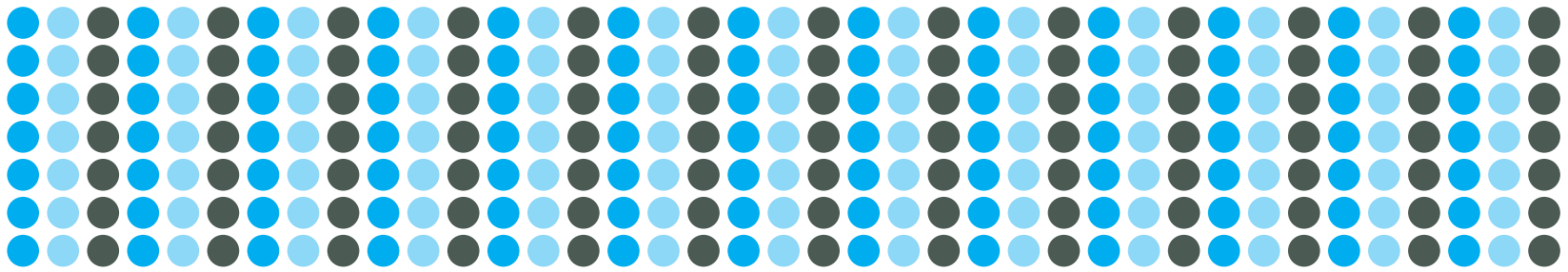
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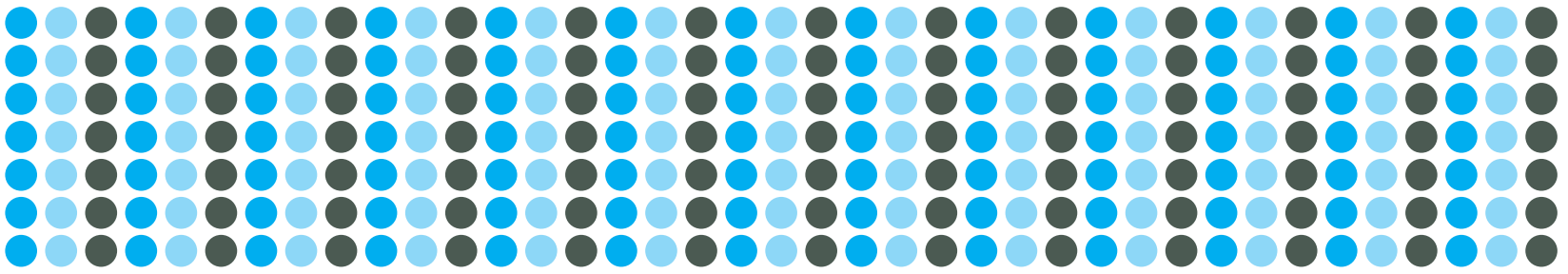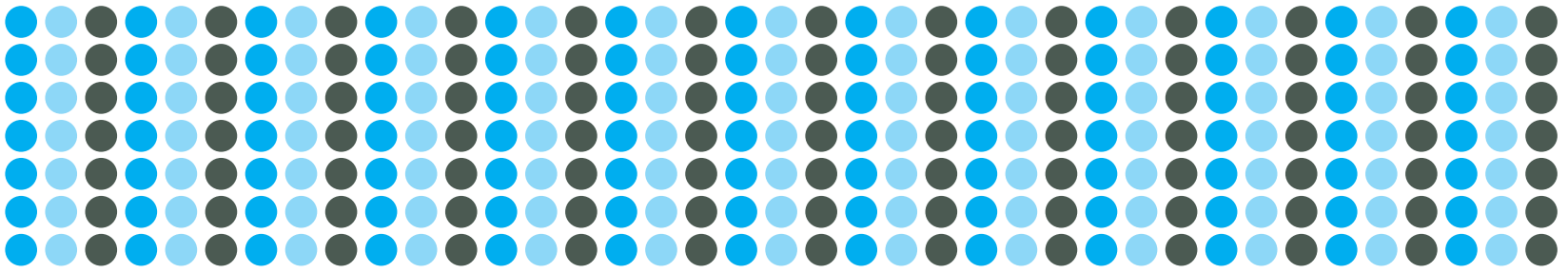
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LIST OF ARTWORK