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Dear Fordham Community,

It is a pleasure to present to you the second issue of the eighth volume of the Fordham Undergraduate Research Journal. This is the first time in its history that FURJ is producing a second issue. With the publication of this online-only issue, FURJ has doubled the number of articles that we typically publish in a given year. We hope that you find this issue as edifying as the first as it contains further examples of the stellar research that is taking place at Fordham.

We at FURJ would like to again express our gratitude to all of the undergraduates who have made this volume possible. To the students who conducted research and submitted to us, your work of wondering, questioning and discovering is enviable. We at FURJ can only hope that your work here continues to inspire future students to participate in the rich culture of research at our university. To the students who have worked on a FURJ staff (or two) this volume, thank you for making it all come alive through your reviewing, editing, designing, marketing and most importantly, your passion for FURJ’s mission.

Though we are a journal conceived and produced by undergraduates, we are the beneficiaries of a great deal of support from Fordham faculty members. Thank you to the members of our Faculty Advisory Board for their guidance and to the other Fordham faculty members who provided reviews of articles for sharing their expertise with Fordham’s undergraduate community. It was a pleasure to collaborate with you all.

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Yours truly,

Daniel Restifo
Editor-in-chief
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How to Look at Social Media: A Selective Phenomenological Examination

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Political outrage, quantified identity, and publicizing the private: these are a few of the unique phenomena produced by social media. As of 2018, an estimated 2.62 billion people use social media worldwide. Therefore, the phenomenological impact of social media, both at the individual and at the collective levels, is expansive. Many of the phenomena produced by social media, however, go unwittingly overlooked by their billions of affected subjects. This article, from a phenomenological perspective, aims to introduce, classify, and describe some of these phenomena. Framed by the technological phenomenology theories of British philosopher of information, Luciano Floridi, and French philosopher of digital design, Stéphane Vial, the underlying conceptual premise of this research is that technological materialization (i.e. the invention of social media) engenders phenomenality and creates new perceptual structures. By reconciling the writings of media philosophers, cultural theorists, and sociologists, this article attempts to produce an introductory outline — within the categories of personal identity, interpersonal communication, and popular ethics — for organizing a phenomenology of social media. It aims to explore what life with social media “feels like.”

Phenomenology of Technology

From a phenomenological perspective, social media are not neutral agents. They are, as some think, impartial or ‘natural’ technological extensions of human social behavior. Instead — and this is true of every technology, both new and old — social media fundamentally reshape the act of perceiving: they introduce entirely new characteristics to our feelings-of-being-in-the-world. That said, as of 2018 an estimated 2.62 billion people worldwide use social media. The United States claims the highest rate of usage with over 81% of the population having at least one social media profile. For better or worse, social media are indispensable components of today’s technological reality. Moreover, many of the phenomena produced by social media go unwittingly overlooked by their billions of affected subjects; the presence of social media is so ubiquitous in modern life that it often gets taken for granted. Before exploring the specific phenomena produced by social media, however, it first must be established exactly how social media, and how technologies more generally, are able to produce new phenomena. French professor of digital design, Stéphane Vial, provides the rationale for this premise.

In his “Ontophany Theory,” which is a forthcoming publication in the journal French Philosophy of Technology Vial states, “technological materialization is a criterion for phenomenal existence...[it] is able to engender phenomenality, or the potential to appear.” In this sense, all technologies, including but not limited to social media, function as structures of perception. Qualitatively registered experiences, or what Vial describes as our feelings-of-being-in-the-world, are produced by and sensitively molded to technology. In his conclusion, Vial consolidates sentiments expressed by earlier technological theorists such as Marshall McLuhan, Neil Postman, and Plato, stating in an aphorism that man is as much part of the machine as the machine is part of man. Today, social media are parts of man.

British philosopher of information, Luciano Floridi, posits a similarly framed theory of technological phenomenology. According to Floridi, the promulgation of information communication technologies (ICTs), which began en-masse with computers in the 1950’s, produced a radical transformation of both humans’ understanding of reality and of themselves. According to Floridi, ICTs made it so that humans are no longer “standalone entities, but rather interconnected informational organisms or inforgs, sharing with biological agents and engineered artefacts a global environment ultimately made of information, the infosphere.” Floridi explains the philosophical implication of this development, saying:

They [ICT’s] are radically transforming devices because they engineer environments that the user is then enabled to enter through (possibly friendly) gateways, experiencing a form of initiation. There is no term for this radical form of re-engineering, so we may use re-ontologizing as a neologism to refer to a very radical form of re-engineering, one that not only designs, constructs, or structures a system (e.g. a company, a machine, or some artefact) anew, but that fundamentally transforms its intrinsic nature, that is, its ontology. In this sense, ICTs are not merely re-engineering but actually re-ontologizing our world.

As social media are some of the most pervasive information communication technologies at work in the world today, this paper aims to selectively classify and describe — within the categories of identity, interpersonal communication, and popular ethics — what this modern “re-ontologization” looks like.

To channel Theodor Adorno from his “How to Look at Televisions,” media philosophy addresses the fundamentally human question of how one understands influences on his or her mind and perception. Given today’s media landscape, this task is not to be taken lightly. According to data released by the company itself, Facebook has over two billion monthly active users, 66% of whom access the network every day. As of 2017, Instagram follows behind with a still sizeable 700 million monthly active users; Twitter registers in with 328 million and snapchat with an estimate 255 million. As social media companies expand into the developing world, daily usage of these platforms is expected to increase exponentially. Additionally, social media networks are often accessed through mobile devices, what Floridi would describe as ICT “gateways.” Initiation rates into these new gateways are unprecedentedly high. According to Dscout researcher Michael Winnick, the average smartphone user touches his or her device roughly 2.617 times per day and, by the year 2020, it is estimated that the number of global smartphone users will climb to a staggering 6.1 billion.
Pending questions of Internet connectivity, over 77% of the global population could have access to social media by that very near date. As a result, media philosophy has a crucial societal influence and arguably a moral obligation to help elucidate the wide-spread phenomenological impacts wrought by social media. To begin, we will explore how social media produce new phenomena related to personal identity. While many of the identity-related phenomena are interdependent, identity on social media can be characterized by the distinct phenomena of identity ambiguity, optimized and de-authenticated self-presentation, the quantification and commodification of identity, and the publicizing of the private. As will be shown, none of these phenomena are without significant consequences, both for individual social media users and for social media society as a whole.

**Phenomenology of Identity on Social Media**

With self-presentation on social media, a common phenomenon is ambiguity. Constructing identity on social media is a multi-layered and frequently a multi-platform undertaking. One can simultaneously manage a Twitter profile to reflect intellectual musings, a Snapchat profile to broadcast social activities, an Instagram profile to highlight aesthetic moments, and a profile on Facebook to display a fuller, more comprehensive life-portrait. These various, and often disparate iterations of identity are then reconciled in co-presence with one’s physical self-presentation. Therefore, it could be said that social media have confused “the relationship between what is true and what is “true here,” true in simulation.” Philosopher Michael Lynch writes on the inevitable contradiction-of-self that results from such technologies, saying:

> How you define yourself at a certain time – kind, clever, embarrassed, etc.- can come into conflict with other self-representations, and that conflict can initiate change in your overall self-conception.\textsuperscript{xviii}

People are products of stories that they and others tell. Today, those stories are increasingly constructed online in social networks, often through conflicting narratives.\textsuperscript{xv} In providing numerous opportunities to concurrently construct identities, social media have engendered a lifestyle that MIT sociologist Sherry Turkle calls “rapid cycling.” In short, rapid cycling references the phenomenon of how increased outlets for identity formation, as provided by social media, necessarily heighten the responsibility of having to manage and emotionally resolve them. For many, and as the aforementioned social media usage statistics testify to, this responsibility is significantly time-consuming, cumbersome, and an inherent emotional drain for the subject. Therefore, identity on social media becomes characterized by a distinct, vexing ambiguity for its users. Much of this experienced ambiguity from social media use results from the sharing and reception of images. While images have been a means of self-presentation throughout human history, social media have encouraged their manipulation in an unprecedented phenomenological way.

Given the calculated nature of their posting, images on social media strive “to be better, more beautiful, and more alive” than the actual referents themselves.\textsuperscript{xv} Such idealization of images on social media is evident everywhere, and its proliferation is responsible for materializing a second phenomenon: the de-authentication of physical identity. Seldom is an Instagram posting devoid of an enhancing filter, and rarely is an unflattering photo intentionally posted on Facebook by its subject. Images on social media, therefore, always aim to serve the interests of the person who posts them. Images depicting domestic tranquility, flawless bikini-clad figures, and beautiful exotic vacation sites adorn each and every platform, always selectively chosen to convey the most flattering self-representation possible. Now, even if one lives a profoundly disordered life, they can still feign order via their digital identity online. This is how social media have de-authenticated the physical: lived experience simply matters less in the context of accepted cultural practices for social media self-presentation. According to German cultural theorist Byung-Chul Han, such use of imagery has subverted the concept of truth. For Han, the truth in photography is that it is inseparable from its referent: it is bound to a real object, and its hallmark is love and fidelity to this source.\textsuperscript{xvi} Photography, he continues, “does not stand for a realm of fiction or manipulation; it occupies the realm of truth.” Instead of occupying the realm of truth, however, identity-construction on today’s social media creates a mania of optimization, putting a definitive end to the time of true physical representation. Han supports this point, writing:

> “When faced with reality, which strikes us as something imperfect, we run away into the realm of images. Today, we do not enlist religion so much as technologies of optimization in order to confront the reality of bodies, time, death, and so on. [Digital photography] is defactifying the world… [It] marks the end of the real. It no longer points to a real referent. [It] collects and connects quotes from the real and mixes them with the imaginary.”\textsuperscript{xviii}

Social media have thereby diminished the importance of lived, physical experience, specifically as it relates to personal identity. Lynch’s analysis of online identity in respect to its implication for truth is supportive of this claim too. Lynch asks the question: if digital identity obscures the difference between the primary and secondary, between what is made and what is, then what is the point of discussing objectivity?\textsuperscript{xvii} A quick glance through an Instagram feed validates this rhetorical point: non-filtered, non-strategically staged images earn less social capital than ones that are optimized. At the broadest societal level, users of social media appear willing and able to participate in this trade-off of truth for optimization. This is reflected in how digitally enhanced images, depicting unblemished skin or sultry artificial lighting, earn, on average, more positive systemic feedback than ones that don’t use augmentations. To measure this feedback, or earned social capital, social media platforms utilize built-in, quantifiable value systems. This introduces the third distinct phenomenon of identity on social media: quantification.

Evaluating a posting on social media is simple, all one needs to do is count the likes, reposts, hearts, comments, etc, to determine its social worth. The common thinking goes that the more likes a posting earns, along with other metrics, the higher its value. This element of social media, of quantifying identity, has introduced a new schema for self-evaluation and perpetuated self-aggrandizement as an ideal. Due to the ubiquity of social media and its conjoined twin, the smartphone, an individual can now earn a living from achieving upward mobility on social media platforms. Models and musicians alike commonly sell advertising space on their personal profiles. This concept, of quantifying identity to the point of commodification, is one distinct to today’s social media use. Tim Wu, a professor at Co-
scribes this phenomenon writing:

“By presenting us with example upon example, social media [have] legitimated self-aggrandizement as an objective for ever more of us. By encouraging anyone to capture the attention of others with the spectacle of one’s self – in some cases, even to the point of earning a living by it – it warps our understanding of our own existence and its relation to others.”xx

Furthermore, there is a general rule on social media that the more intimate a photo posted, the likelier it is to accrue positive social feedback. Postings depicting the first contact of a wedding kiss, or the moment after child-birth, or even written descriptions of self-harming thoughts, immediately galvanize disproportionate attention and likes. For Han, this phenomenon constitutes “compulsive icono-pornography”. xxiv According to Han, compulsive icono-pornography on social media is the phenomenon of publicizing the private, wherein social networks are used as “exhibition rooms for highly personal matters” to the exhibitionists social benefit.”xxv One’s quantified identity, therefore, is dependent on their revealing intimate, potentially prurient, voyeuristic fodder. Arguably, humans have a natural voyeuristic instinct — a desire to witness the novel intimacy of others. Nevertheless, by providing a technological system to exhibit one’s intimacy and gain social capital through it, social media produced compulsive icono-pornography as a distinct societal phenomenon. This, however, is only a limited examination of how social media manifest new understandings of self. An examination into the unique phenomena produced by social media that alter one’s relation to others —including isolated communication, delocalization of communication, and temporal dislocation in communication — proves equally fruitful.

**Phenomenology of Interpersonal Communication on Social Media**

Judging by their founders’ public statements, social media networks claim to be connective utilities. Facebook’s former mission statement, for example, as frequently relayed by the CEO himself, was “to make the world more connected and open.” xxvi Upon examination, however, connectivity is not a genuine phenomenological attribute of social media. Instead, interpersonal communication via social media is essentially characterized by isolation. Consider this: only in a solitary state, when an individual has withdrawn their attention from their physical environment, can they truly connect with others through social media. Therefore, the practice of communicating via social media is isolative by definition; it requires the user to be in a physical state of aloneness that is sufficient to support sustained attention to the allegedly connective media. Such isolation, or withdrawal, is observed in innumerable settings throughout the modern world. People glare down to use social media while waiting in a line in a restaurant, walking down the sidewalk, or even at a public sporting event. More invested users of social media are apt to make themselves similarly “alone” while at parties, at their jobs, or even while on dates, all to the ultimate end of communicating with others who are physically elsewhere. Turkle poignantly captures this phenomenon of social media’s communicative isolation, writing, “…being alone can start to seem like a precondition for being together because it is easier to communicate if you can focus, without interruption, on your screen.”xxvii She also highlights the broader, societal impact of this social media phenomenon, saying:

“In this new regime, a train station (like an airport, a café, or a park) is no longer a communal space but a place of social collection: people come together but do not speak to each other. Each is tethered to a mobile device and to the people and places to which that device serves as a portal.”xxviii

Those portals she references are social media platforms, and societies’ flight into them has dramatically inverted former communicative norms. Social media also are used to communicate in settings that were previously considered “quiet,” or private. According to a 2015 Consumer Mobility Report conducted by Bank of America, 71% of Americans sleep with-or-next-to their mobile devices.xxix Presumably, many do so for communicative purposes: so they can check their social media before bed, during an interruption in their sleep at night, or first thing after they wake. Therefore, isolated settings can be seen as preconditions for communicating interpersonally via social media. Now, in order for people to be together, they first must be alone. But, how exactly are people together? When people use social media to intimate communication—such as by exchanging snapshots back-and-forth—they are always de-temporalized in time and dislocated in space, like phantoms. This phenomenon marks a stark contrast between physical communicative practices, which move linearly through time and are confined in physical space, and the communicative practices of social media, which are bound by neither.

The methods of social media attempt to bridge gaps between physically distant individuals. To achieve this, however, social media must wedge a shared digital interface between said persons, to feign mutual localization (so they see the same message) and shared temporality (at a mutually understood time). When a person receives a Snapchat, for example, they observe, in their own real-time, a photograph of someone else that was taken in the past and that exists in a now-bygone physical location. The Snapchat interface, however, presents photographs between users as if their temporality and locality were in fact shared. This phenomenon is illustrative of interpersonal communication on all social media; while their methods purport to acquaint people in familiarized ways, their genuine phenomenological hallmarks are delocalization and de-temporality. Over fifty years ago, Philosopher Gunther Anders documented this sort of phantom-like communicative phenomenon in his reflections on television. I suggest that his analysis is aptly applicable to today’s social media. In 1956, Anders described:

“The method allegedly intended to bring the object close to us, actually serves to veil the object, to alienate it, or simply to do away with it altogether…this is perhaps even more plausible than our general thesis, that when all the various and variously distant regions of the world are brought equally close to us, the world as such vanishes.”xxix

Today’s social media companies, however, attempt to characterize their delocalization and de-temporality in a completely opposite light. At the end of 2017, for example, the Facebook CEO unveiled the new company mission statement aiming “To give people the power…to bring the world closer together.”xxx In my view, such a statement can be said to represent the underlying, and yet ultimately misleading, communicative mantra of social media companies collectively. Therefore, while social media advertise that they bring the world closer, in truth they end up rendering the communicative experience of their users’ half-present and half-absent, like a phantom. To return to
Anders, the implication of this phenomenon is wide-reaching: when the phantom-intimacy becomes real, he says, then reality itself becomes phantom-like. Most certainly, the mass-scale shift in social communication from physical to digitally mediated is significant. When people touch their phones over 2,000 times per day, those 2,000 moments are forfeited from the physical world. What are the new phenomenological consequences produced by this?

For one, interpersonal exchange via social networks has caused a fading of communication with real others. Han’s analysis can be used to extrapolate on this concept. By stripping communication of tactility and physicality, he argues, communication over social media becomes faceless, bodiless, and increasingly delocalized from its original source. One can never even be certain, for example, of who is truly behind the profile they engage with. As a phenomenon colloquially known as “catfishing,” social media can dislocate inter-personal communication to a scale never-before possible. There are frequent reports, for example, of malicious deception occurring through social media; it is perhaps now easier than ever before to pretend to be someone else. Back in the age of hand-written letters, a receiver could decipher the handwriting of its sender to detect potential deception. Given the physical isolation of its agents and the phantom-like quality of its medium, however, no such assurances are possible when communicating with social media. As Vial suggests in his “Ontophany Theory,” phenomena require a device to appear. As devices, social media presuppose isolation in order to function as intended. Such isolation is further reinforced by the isolative communicative content itself: content that jumps through time is wretched from its physical context and is often confusingly delocalized for its intended receiver. When Han claims that blogs, Twitter and Facebook “demediate” communication, these are the elements of the phenomenon he refers to.

Phenomenology of Popular Ethics on Social Media
What new phenomenological influence, then, does such “demediated” communication via social media have on popular ethics? What new phenomena do social media create as they shape the dispensation of societies’ ethical judgments? As Lynch notes, all ethical judgments are necessarily predicated on access to information. Today, people increasingly predicate their ethical judgments on the deluge of information provided to them by social media. This practice has materialized a new, subtly coercive pattern of ethical evaluation, one in which mandatory transparency is valued above all else. When writing on Twitter, posting on Facebook, or updating Snapchat, the idea is that you, and your thoughts, are visible, documented, and necessarily subject to public observation. The technological interfaces of social media, in how “post” options and “share” buttons explicitly facilitate the personal transmission of news, is responsible for begetting this subtle mandate of transparency in society. The virtue is applied to civic events and public speakers, too; they are always recorded by a bystander’s iPhone, to inevitably be “shared” online. Lynch observed this phenomenon of mass-scale exposure as well, writing:

We all understand that there is more known about what each of us thinks, feels and values than ever before. It can be hard to shake the feeling that we are living in an updated version of Jeremy Bentham’s famous panopticon...

Perpetuated by their corporate axioms of ‘sharing,’ social media encourage the reporting and deliberation of all things ethical, by all users, at all times. Arguably this phenomenon of mandatory transparency has a corrosive effect on governance.

Today, one can Google someone’s name, click on his or her Twitter, and suddenly access all of his or her public thoughts. College students attend public lectures, begin to film the speaker, and eagerly wait for his or her tongue to suddenly slip. Then, the college students get to capture the “gotcha” moment and immediately post it to Facebook. In this sense, constant social media observation, the nakedness of public thought, and general civic transparency imposes a temporality on political communication. For a politician to broach a controversial subject, or to discuss provocative ideas, represents too great a risk when he or she is constantly being watched. Hot mics, recordings at private dinners, and incidental data collection: all then get posted to social media to be devoured by the collective ethical hive. Then, the collective ethical hive springs into action as a knee-jerk judiciary, making one’s ethical judgments apparent to all of one’s followers. These incidences illustrate the types of mandatory transparency, as materialized by social media, that dissolve confidentiality and limit expression of liberty. The doctrine of political transparency on social media has therefore created an obsession with, and fear of, the present. In effect, this phenomenon suppresses unpopular opinion and makes vulnerability a perpetual condition. One can observe this phenomenon whenever a controversial figure speaks on a college campus. Inevitably, an eager swarm of students awaits the speaker, to film and then broadcast every mispronounced word. While some, like Bentham, postulate that transparency promotes good behavior, its technological proliferation through social media created a crisis of political conformity. Byung-Chul Han summarizes this phenomenon of stifling transparency, writing:

Under the dictate of transparency...hardly anything is ventured. The imperative of transparency produces a strong compulsion to conform. Like constant video surveillance, it gives rise to the feeling of being watched. Therein lies the panoptic effect.

Today, people are being watched more than any other time in human history. Interestingly, such observation is not conducted by from a top-down authoritarian power structure, but instead by one’s neighbors and friends. A final ethical phenomenon materialized by social media, and arguably one of the most noticeable within the public sphere, is the mass-perception of outrage.

First, some background. When Vial describes phenomenology, he refers to the “phenomenal quality of the world we experience, or the...qualitatively registered, or felt, aspect of the being-in-the-world experience." Today, life on social media bombards its users with outbursts of outrage, which characterizes today’s feeling of being-in-the-world. This phenomenon lies in the technical natures of social media themselves. Analysis from Han supports this view. Han reasons that because social media “enable affective discharge right away,” they are uniquely efficient at bundling and mobilizing attention. On the basis of their temporality, he continues, social media encourage impulsive reaction more than any previous analog medium. This phenomenon is glaringly self evident. Whenever someone witnesses what they deem as an injustice, or even have a pseudo-critical thought, they broadcast it onto social media within minutes. Accordingly, society documents more outrage, in the
forms of dubiously offensive speech or ill-conceived ethical critique, simply because social media allow them to. That said, such incidents of outrage generally serve the ethical interests of the individual sharing them, and not necessarily a larger communal whole. When people discharge outrage on social media, they do so, in part, to publicly position themselves as “being on the right ethical side.” Han notes this as well. He concludes that even though “shitstorms” of outrage are an authentic phenomenon of social media, they “well up abruptly – [but] dissipate just as soon.” This phenomenon stands in stark comparison to traditional preconditions for outrage, when one would have to write a letter to an editor, or physically seek out a journalist. Arguably, these former means of ethical discharge required a more measured stance than the ones required by social media today. As a quick glance through any social media feed will confirm, measured stances marked by protracted forethought and revision, are few and far between. Considering the subtly coercive expectation of transparency and the mass perception of outrage, the ethical phenomena produced by social media are perhaps among the most worrisome. If individuals in civic society are ethically self-serving and pressured into conformity, then the prospect for political progress seems dim.

Conclusion on The Phenomenology of Social Media

The phenomenological impact of social media, both at the individual and at the collective levels, is expansive. In beginning to trace it out, this article aimed only to provide a basic introductory framework for the subject. As social media continue to evolve and proliferate, so too will the need to study them. On the horizon, there are innumerable phenomena of social media that have yet to “technologically materialize.” When they do, I hope this article encourages their exploration. For the sake of the present, however, this article examined three phenomenological categories of felt-human-experience that are profoundly influenced, and not always positively so, by the use of social media: the construction of identity, interpersonal communication, and popular political ethics. After examining the influences within these categories, many of which people are only vaguely but uncomfortably aware of, the next step is to begin a discussion about their desirability. Living a purposeful life requires understanding oneself and one’s relation to the world. As suggested by the two billion active monthly users of social media, we must resist the impulse to only be passive participants.
Exploring the Role of Parental Career Expectation on the Career Decisions of Second-generation Americans

Taina Quiles, Department of Psychology, Fordham University, New York, NY.

With a large number of immigrant families in the U.S., it is important to consider how second-generation Americans (SGAs), or the children of immigrants, will advance in their educational and career trajectories. The current study employs thematic analysis of data from a focus group of 15 SGAs to address this gap by exploring family and sociocultural processes that may influence their career trajectories. It was hypothesized that SGA students with high levels of acculturation are more likely to adjust their career goals to match their parents’ expectations and have parents who are expressive of career expectations. This group of SGA students was unlikely to change their career paths even if their parents did not approve and most parents did not express career expectations and often consulting others, like their advisors about their career goals. Overall, this study suggests that SGA students are in need of mentors with whom they identify.

Choosing a career path is a pivotal milestone for college students; however, career-oriented conversations often begin long before young adults arrive on campus (Workman, 2015). Research suggests that parents are the most influential social factor in developing career goals and making academic decisions (Sawitri, Creed & Zimmer-Gembeck, 2014). Familial influence may be especially important to second-generation American students (SGAs): youth born in the United States with at least one parent born in another country (Mio, Barker, & Santos Tumambing, 2012). The current study seeks to examine the role of parental expectations on the career decisions of SGAs.

Education and Career Decision Process
Adolescence is an important time for individuals to develop interests and perceptions of their adult lives; many choices and capabilities established during this developmental period become foundational to their educational and career pursuits (Paa & McWhirter, 2000). Research shows that coming to a career decision is a process. Gati and Asher (2001) suggest three steps: (1) prescreening, or gathering information, (2) in-depth exploration and (3) finally deciding. Another model, based on a behavioral decision-making framework highlights two major steps: (1) finding strategies to minimize negative feelings and justify choices, and (2) making evaluations to determine preferences (Sauermann, 2005).

Social, cultural, and physical characteristics of students’ environments influence their career decisions (Whiston & Keller, 2004). Parents have the greatest influence on vocational development and contribute to their child’s formation of educational expectations (Whiston & Keller, 2004; Schneider, Keesler, &Morlock, 2010). These expectations are associated with students’ commitment to and achievement of their educational goals. Low educational expectations can cause children to restrict their vocational aspirations. Additionally, parental support often facilitates greater levels of career exploration and higher self-efficacy, than other relationships (Whiston & Keller, 2004; Schneider, Keesler, & Morlock, 2010). The role of sociocultural factors on the career-making decisions of youth from immigrant families however has been understudied.

Parental Expectation and Cultural Identity in the U.S.
As the demographic composition of the U.S. continues to shift, it is important to consider how this ever-growing group of young Americans will advance in their educational and career trajectories. Sixty percent of second-generation Americans consider themselves “typical” Americans and do not differentiate themselves from other generations (Pew Research Center, 2013). However, some SGAs struggle to build a cultural identity because they feel they are between two worlds: the American world and that of their parents’ heritage (Giguere, Lalonde, & Lou, 2010). This may have implications for career-related decisions during young adulthood.

The decision to pursue a particular career may be especially complicated among immigrant families from collectivist nations—such as Hispanic and Asian countries—that prioritize the wellbeing and success of the family unit over the individual (Mio, Barker, & Santos Tumambing, 2012). The U.S. consistently ranks as the most individualistic country, meaning that individuals are encouraged to be autonomous. Many SGAs experience a tension between focusing on the family, and becoming independent, which can lead to internal conflict (Giguere, Lalonde, & Lou, 2010). Therefore, youth from collectivist cultures growing up in the U.S. may struggle with different conceptions of the “self” (Yates & Oliveira, 2016), which may exacerbate difficult career decisions.

The extent to which individuals adopt collectivist or individualistic values is partly determined by their level of acculturation or enculturation. Acculturation is the process of borrowing or adopting traits from a new culture, which requires: an awareness of the similarities and differences in their host country; acceptance of those different from them; adaptation through adjustments to their speech and behavior; and ultimately taking on this new way of life (Weinreich, 2009). Enculturation is the process of acquiring competencies from one’s country of origin, both informally (through child rearing) and formally (through institutions like schools).

While many believe that well-adjusted SGAs will have characteristics from both cultures, there is little research, and mixed findings, on how acculturation and enculturation affect their educational and career development. One study found that ac-
Participants attended an hour-long focus group session on campus. Three focus groups, each with approximately five participants, were conducted over two weeks. Upon arriving, participants received a thought sheet with the list of focus group questions and contemplated their responses. After all participants had arrived, consent forms were reviewed, and submitted if they chose to participate. Participants completed a Qualtrics survey (described below), online, via computer or iPad before the discussion. Upon completion of the survey, participants gathered around a table and discussed: their families, their career decisions, and their opinions on their status as a SGA. The following questions were used as a guide.

1. “What are the different careers you have considered in the past?”
2. “Do you know what career you’d like to pursue? If so, how did you arrive at this particular career?”
3. “How would you describe your family’s role in your career decision making?”
4. “How much importance do you place on your parents’ opinion of your career?”

Participants volunteered responses to questions posed by the moderator or to points made by others attending the focus group. They were only called on if they were not as talkative as others, or if the conversation stalled. The primary investigator moderated each focus group with one notetaker. The notetaker was responsible for keeping notes on what each speaker said, body movements, and time. Each focus group session was recorded, and later transcribed. At the end of each session, participants were compensated with $30 gift cards. The Institutional Review Board at Fordham University approved study procedures.

It is noteworthy that all members of the research team were either first or second-generation Americans themselves, and attended the same university as the participants. This served as an advantage in establishing rapport with participants and interpreting results. Reflexivity is an approach, which acknowledges that as the primary data collection tool, researchers will influence the research process. This requires them to reflect on their possible biases (Rasmussen, Akinsulure-Smith, & Chu, 2016). Researchers had conversations to address the ways their experiences could affect their view of the data collected. Additionally, triangulation was used to account for potential biases.

Measures

Parental Attachment

This questionnaire measures the security of a parental attachment. Using the Parental Attachment Questionnaire by Kenny and Kenny (1991), participants used a five-point scale to answer 55 questions (α = .97).

Acculturation

This scale measures how much familiarity one has with their country of origin, and a country from which they migrated. Using the Vancouver Acculturation Index, by Ryder, Alden and Paulhus (2000), participants used a nine-point scale to answer twenty questions (α = .90).

Familism

This scale measures individuals’ beliefs regarding the role of children in the family. Using the Mexican-American Cultural Values Scale, by Knight, et al. (2010), participants used a five-point scale to answer 16 questions. The questionnaire has three subscales: support/closeness, obligation and referent. This study focuses on using the obligation scale (α = .71) to measure how much responsibility one feels they owe to their family.

Racial-Ethnic Socialization

This scale measures the ways in which families conversed about or participated in activities related to their ethnicities as well as their beliefs about how others perceived them. Using the Racial Ethnic Socialization scale by Hughes and Johnson (2001), participants used a five-point scale to answer 19 questions (α = .90), which was used to calculate a mean score.
Data Analysis

Quantitative measures (described above) were used for descriptive purposes, to better characterize our sample. The main analyses were based on qualitative data from the focus groups. Initially, we employed methods consistent with constructivist grounded theory, which uses a bottom-up approach to determine key themes present (Charmaz, 2008). Members of the research team reviewed the transcripts and created memos- (one or two word summary) after each time a participant had spoken. Memos were discussed and reduced to ten major themes (described below). As a coding exercise, transcripts were coded, using these ten themes in Dedoose (2016). After researchers felt comfortable using these codes, the transcripts were broken into 209 chunks, as described by Miles and Huberman (1994). In a spreadsheet, each chunk was assigned up to two codes. Each researcher coded two transcripts separately. After the transcripts were coded, a meeting was held to determine the interrater reliability through percent match. The goal was to obtain a 75% match between two coders; however, after three attempts with percent match ranging from 40–65%, the research team conducted a thematic analysis.

Thematic analysis is an approach used to identify, analyze, and report patterns within the data, and this technique allows flexibility to explore new topics (Braun & Clarke, 2006). Using a thematic analysis, nine themes emerge from the data. The coding sheet was filtered by the PI’s primary and secondary codes and summaries and descriptive statistics were recorded. Since this study was exploratory in nature, thematic analysis was helpful in data reduction.

Results

In terms of acculturation, the heritage sub-score, (how much they associate with their heritage culture) was 7.37 and the mean mainstream acculturation score was 6.28. The mean racial-ethnic socialization score was 2.08. Descriptive Statistics are reported in Table 1. In addition to discussing parental career expectations, SGAs in the focus group spoke about their feelings regarding their generational status, pressures to excel in their careers and the struggles they faced in their academic pursuits.

### Table 1. Descriptive Statistics on Focus Group Participants (N = 15)

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese</td>
<td>4</td>
<td>26.6%</td>
</tr>
<tr>
<td>Arab</td>
<td>1</td>
<td>6.7%</td>
</tr>
<tr>
<td>Mexican</td>
<td>2</td>
<td>13.3%</td>
</tr>
<tr>
<td>Dominican</td>
<td>3</td>
<td>19.3%</td>
</tr>
<tr>
<td>Bengali</td>
<td>3</td>
<td>19.3%</td>
</tr>
<tr>
<td>Mixed Ethnicity</td>
<td>2</td>
<td>13.3%</td>
</tr>
</tbody>
</table>

Table 1 Continued. Descriptive Statistics on Focus Group Participants (N = 15).

<table>
<thead>
<tr>
<th>Key Sociocultural Measures</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parental Attachment</td>
<td>3.44</td>
<td>0.76</td>
</tr>
<tr>
<td>Parents as Facilitators of Independence</td>
<td>3.18</td>
<td>0.94</td>
</tr>
<tr>
<td>Independence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Familial Obligation</td>
<td>3.19</td>
<td>0.50</td>
</tr>
<tr>
<td>Acculturation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heritage Subscore</td>
<td>6.28</td>
<td>1.66</td>
</tr>
<tr>
<td>Mainstream Subscore</td>
<td>7.37</td>
<td>1.34</td>
</tr>
<tr>
<td>Racial-Ethnic Socialization</td>
<td>2.08</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Second Generation Characteristics and Pressure to be Excellent

The code Second Generation Characteristics was operationalized as, “Participants’ perception of being a SGA and having immigrant parents.” SGA addressed feelings stuck between two worlds, and strongly identified with their parents’ heritage culture. For instance, one Latina senior said, “Before I’m anything, I’m the child of an immigrant. I am Dominican-American, American comes second”. Living as part of two worlds, however, created a need to both please their parents and participate in mainstream culture.

Overall, this tension was heightened by a Pressure to be Excellent, which is defined as “Pressure from parents or other groups to accomplish a specific career or status in life.” Participants felt they needed to prove that they and others in their ethnic or religious group were succeeding. In this way, their achievements become part of a collective success story. For example, one participant said that when she returns to her parents’ home country, they say, “Yes, our Moroccan daughter is better than the Americans”. This was said even though she is an American herself. Thirteen participants felt that their parents pressured them to achieve excellence despite personal costs. One Caribbean senior said,

“it’s great to be in this very idealistic world where your parents want you to be something but then when it catches up to you, and you’re the one who starts making the payments...it’s no longer your parents dream, but it’s like, your reality.”

However, this pressure may be moderated by birth order or gender. Two female participants with younger, male siblings, felt their brothers did not feel this pressure as strongly and expressed anger at their siblings for not working harder. One Asian senior very passionately stated "My parents have spent a lot of money on them, and so it makes me really angry, because there’s this huge difference between... my performance and theirs..." The other, a Caribbean senior, said that her brother was discouraged from working hard after watching her experience. She says that her brother expressed his goal of “aim[ing] to pass, to have a life outside of school. She believed “that’s not enough”. This suggests that her status as a first-born daughter...
may heighten the sense of obligation to be successful.

Regardless, participants did feel a sense of pressure derived internally from feeling an obligation to pay back their parents. One Latina senior said, “My parents have never said ‘I’ve worked this hard and you owe me this,’ I just think I need to do that.” Another Latina senior said that their parents “reminded [them] a lot of all the sacrifices they made, why [they’re] here” and that it was not a matter of making them happy, but rather, not letting their work go in vain.

Definitions of Success

Generally, parents defined success for their children as a having a stable career, pursuing their passions and living independently. Four participants believed that their parents’ ideal of success was to find a stable career path and to be able to care for themselves. Another four participants believed that their parents defined success as being the best at their career as they could and/or being able to follow their passion. The remaining three believed that their parents equated success with being in the medical field. Despite giving various perspectives of success, participants only defined success in terms of how others view it, and never provided their own definition.

Parental Career Expectation, Influence, and Decisions

Generally, parents only expressed a direct expectation for their child’s career when they wanted them to be a doctor. However, only 7 participants said that their parents gave them an explicit career expectation. Parents only expressed their opinions about their child’s career if they disagreed with what their child was currently pursuing. Often participants felt they cared more about their own academics than their parents did because their parents trusted their decisions.

Throughout their academic and career decision-making processes, participants often asked their parents’ opinions only after they were certain of their decisions. Only one participant said they would change their careers if their parents did not approve, and two participants said they would feel unhappy if they did not have their parent’s approval. One Latina participant said, “I wouldn’t stop doing it, but it really would hurt me, because I really have a passion for what I’m gonna do. Both my parents are everything to me. I would feel broken, I would feel split in half.”

However, four SGAs mentioned that their advisors or teachers greatly influenced their career-making decisions. One participant changed her career path based on a conversation with their major advisor. Another key influence on career decisions was a desire to contribute to the community. Two participants mentioned choosing their medical specialties based on needs from the communities they lived in.

Parental Understanding and Sources of Support

Parental Understanding was defined as, “Parents’ understanding of the systems and functioning of this culture and country.” These SGAs expressed that their parents had difficulty navigating the education system, because they did not experience it themselves. Additionally, language barriers made it difficult for their parents to become involved in school-related activities. One Latina senior said that her parents were unable to help with her homework past the second grade. This poses challenges when parents are unfamiliar with the career paths their children choose to follow. For example, two participants pursuing Psychology felt that their parents did not know the steps necessary to pursue their career path. Three students studying medicine expressed that their parents thought they would begin to practice medicine shortly after finishing their undergraduate degrees.

Students expressed personal difficulties, explored in the code Struggles. The most frequent struggle was the obligation to pay their parents back for their sacrifices (6 students). Many also feared the monetary cost of education (4 students) and felt that their parents were not considerate of the payments they would have to make later on. Each focus group also discussed lack of mentorship from professionals with whom they could identify ethnically.

Sources of Support was defined here as “Those who provided support and what that support looked like”. The extent to which SGAs sought and received support from their parents varied; however, more participants said that their mothers were the more critical parent, in terms of their academics and career choices (6 total). Many described their fathers as laid back and only one participant said her father was more critical. Mothers tended to provide more support academically while fathers provided financially. One participant said, “…my mother has carried me, physically, emotionally, spiritually, like all of it. …I think my dad contributes the ambition, and like, the glitz, and the glam, like let’s do it…the actual work, it’s my mom.”

When asked what kinds of support they wish they had received, participants spoke about emotional and financial support from their parents. In many cases, SGAs had emotionally supportive families, but could not depend on their families for academic support. These SGAs also expressed that it was difficult to find others who had similar values and experiences that they did in school and in pursuing career paths. One student said that she did not meet people like her until college. Additionally, finding opportunities became difficult because they did not know whom to turn to. They acknowledged feeling that people from other generations had an advantage when it came to networking.

Discussion

This study examined the role of parental expectations on the career decisions of SGA students. It was hypothesized that students with high levels of acculturation would be more likely to change their career goals to match that of their parents. However, these students were unlikely to change their career paths even if their parents did not approve and most parents did not express career expectations. Overall, parents who did expressed explicit expectations pushed their children to follow careers valued by the cultural heritage. While parents’ input regarding their children’s career decision process was not influential, their status as SGAs influenced the development of career goals, specialties in their career fields, and access to social and financial support. Many participants expressed that being a SGA was a crucial part of their identity and helped shaped their worldviews. In fact, many of their career goals focused on giving back or filling needs they saw within their ethnic communities and neighborhoods. The pressures associated with their experiences are both internal and societal.

Although not anticipated, one theme that emerged was the value of altruism and strong work ethic; this is consistent with findings in the Pew Research (2013) which report that SGA, more so than other generations, believe they can achieve their goals through hard work. However, work ethic may be influenced by birth order and/or gender. Participants who mentioned their younger brothers, passionately felt that their
younger brothers did not work hard enough. Tangentially, the only male participant did not seem to feel as though he owed his parents anything; however, he also spent a lot of time away from his parents.

Contrary to previous research (Workman, 2015), results from the current study suggest that SGA students would not change their careers to please their parents, but those who did express consulting others about their career goals sought advice from their advisors. This may be because parents of SGAs know less about the U.S. educational system and the social demands for their careers. Many barriers, particularly language, cause SGAs to begin working independently at an early age; for example, many students reported doing homework on their own after the second grade or having to negotiate with professionals on behalf of their parent due to language barriers, thus practicing autonomy at an early age.

Difficulties pursuing their careers stem from either financial hardship or inadequate social capital compared to those in other generations. SGAs mentioned difficulty locating/securing mentorship due to a lack of mentors with whom they identified ethnically. This limited their networking and may have deprived them of opportunities. However, trouble choosing a career stemmed from a lack of exposure to other careers. While parents did not influence career-making decisions, they did influence their children’s perceptions of success. Interestingly, the students in this sample defined success solely through their influence their children’s perceptions of success. Interestingly, parents did not influence career-making process, they did career stemmed from a lack of exposure to other careers. While. While identifying ethnically. This limited their networking and may have racial or perspective.

Future studies could be improved by having a larger, more diverse sample. With a predominantly female focus group, it was not possible to contrast experience by gender. It would also be important to gain a more diverse group of SGAs, varied by not only gender, but socioeconomic status, ethnicity and generational status.

Overall, this study suggests that SGAs students are in need of mentors with whom they identify; this is due to the lack of representation of professionals from similar ethnicities in the fields they are pursuing. Additionally, parents need to receive education about the culture in this system. Both issues can be addressed in schools through early mentoring, more career exposure, and resources for immigrant parents and families that will allow them to better support their students in the career-making process.
Developmental Changes in Amygdala Functional Connectivity During Middle Childhood

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Amy K. Roy, Ph.D., Fordham University, Bronx, NY.

The amygdala is a brain region that contributes to emotional expression, particularly fear, rage, and aggression. The affective and cognitive processes involved in emotion regulation are thought to emerge from connections between the amygdala and the prefrontal cortex. Recent evidence suggests that maturation of amygdala-prefrontal circuits during childhood underlies the development of emotion regulation skills. The present study used resting-state fMRI to examine the relationship between amygdala intrinsic functional connectivity (iFC) and age in a sample of typically developing children, ranging from 5-9 years old (n=39). We further examined how this connectivity was related to emotion lability, using a parent-report scale, the Emotion Regulation Checklist (ERC). Results show decreases in iFC between the right and left amygdala with increasing age. Additionally, right amygdala iFC to left amygdala correlated with the ERC Lability/Negativity scale (r=0.32, p=0.04); suggesting that age-related decreases in bilateral iFC of the amygdala may play a role in decreasing lability in children.

Introduction
The amygdala is an almond shaped limbic structure located in the medial temporal lobe that plays a central role in emotion; especially fear, rage and aggression. It has been implicated in detecting and learning emotionally significant cues that are necessary for emotional reactivity (Casey et al., 2008). Functional and anatomical connectivity of the amygdala with other subcortical brain regions such as the ventral striatum may account for the complex nature of emotions (Etkin et al., 2015). Furthermore, these profuse connections underlie the visceral and autonomic responses that are part of the emotional experience (Freese & Amaral, 2006). In contrast, the amygdala connections with cortical regions, such as the prefrontal cortex (PFC), are thought to underlie the regulation of emotion (Banks et al., 2007). The development of emotion regulation is a process that continues throughout childhood, likely following the protracted development of the PFC and its connections with limbic regions such as the amygdala.

Emotional responses generated by the amygdala are modulated by several regions of the PFC such as the dorsolateral prefrontal cortex (dlPFC) and the ventrolateral PFC (vlPFC) (Etkin et al., 2015). A review paper by Ahmed and colleagues (2015) discussed the distinctive role of each PFC region involved in this complex process. For example, the dlPFC plays a major role in down-regulation of emotion resulting from negative emotional stimuli, while the vlPFC is thought to be involved in inhibitory control of both emotional and non-emotional stimuli. Furthermore, medial regions of the PFC are involved in understanding emotions, which gives them a central role in social cognitive processes. Lastly, the orbitofrontal cortex (OFC) is associated with reward and punishment and as a result plays a significant role in adaptive learning (Etkin et al., 2015).

Development of emotion regulation appears to coincide with the extensive structural and functional changes in the brain that occur during childhood. Approximately 90% of the human brain volume is realized by the age of six; however, grey and white matter continue to undergo rapid and substantial changes throughout adolescence (Casey et al., 2008). More specifically, grey matter volume changes follow an inverted U-shape graph shape throughout development, while white matter volume continues to increase in a linear fashion. Further studies have shown that higher-order association areas that are responsible for cognitive processes such as emotion regulation, mature much later than areas involved in motor and sensory functions, including the amygdala (Casey et al., 2008). The earlier maturation of the amygdala than the PFC has been termed a “developmental mismatch” or “imbalance” of neural systems (p.13, Ahmed et al., 2015). This developmental imbalance has been proposed to underlie the greater emotional reactivity and poorer regulation observed in children and adolescents than adults.

The Triadic Systems Model (Ernst, 2014) describes early development as shifts in an imbalance among three critical regions: the amygdala, the striatum, and the PFC. According to this model, the PFC is involved in regulatory processes, striatum in approach behaviors, and the amygdala in avoidant behaviors. These systems follow a different developmental and functional trajectory from each other. The functional differences between these three systems can be classified as quantitative or qualitative (Ernst, 2014). Quantitative functioning describes the idea that different age groups engage in these regions at different degrees, while qualitative functioning describes the change in dependence on one system to another. Both the Triadic Systems Model and developmental mismatch identify brain systems that develop at different times, providing neural bases for the development of emotion regulation processes across childhood and adolescence.

Studies suggest that amygdala activity in response to emotional, particularly fearful faces changes with age following an inverted U shape (Gee et al., 2013). Specifically, adolescents show higher amygdala activity than children or adults. This is consistent with previous work that has shown increasing amygdala responses to negative emotional pictures between the ages of 3.5 to 8 (Perlman & Pelphrey, 2011). This trend changes as children enter adolescence where amygdala activity is then reduced and mPFC activation increases (Gee et al., 2013). This is an indication of a switch from bottom up processing to greater top down regulation in later in development. These results also suggest that children’s ability to acquire and properly respond to an emotional stimulus is directly related to advancement of neuronal circuitry involving the amygdala.

Increased amygdala functional connectivity is a suggested neuronal mechanism of a child’s developing and improving
DEVELOPMENTAL CHANGES IN AMYGDALA

emotion regulation (Mather, Carstensen, 2005). A child’s ability to control their emotional state gradually improves with their age as they develop more intricate functional connectivity between the amygdala and regulatory brain regions. The task-based fMRI study described earlier, that demonstrated increased amygdala activity with age, also found increased amygdala-medial PFC connectivity in children between the ages of 4 and 10 (Gee et al., 2013). Interestingly, after the age of 10, participants demonstrated decreased amygdala-medial PFC connectivity with age. Similar results were obtained by another study that demonstrated a positive correlation between age and amygdala- anterior cingulate cortex (ACC) connectivity in children (Wu et al., 2015). In contrast, the resting state fMRI connectivity studies demonstrated no significant age-dependent change in amygdala-medial PFC connectivity until the age of 10 (Gabard-Durnam et al., 2014). However, after the age of 10, there was increased age-dependent amygdala-medial PFC connectivity. Despite these initial studies, there is still a lot that we do not know about the development of the amygdala’s functional connections in childhood. However, it is clear that these functional network developmental shifts represent the critical stage of transitioning from childhood to adolescence.

Several studies have demonstrated lateralization of the amygdala and speculate hemispheric differences in its function. For example, meta-analyses of amygdala activation have shown a significant increase only in the right amygdala when presented tasks involving face recognition (Herbert et al., 2009). Additionally, evidence suggests that fear conditioning is also mostly lateralized in the right amygdala. On the other hand, semantic tasks such as word categorization based on emotional aspects showed increased activation of the left amygdala. It is also hypothesized that the right amygdala is in charge of the quick detection of emotional stimuli, while the left side for slower and more intricate assessment of the stimuli (Pagliaccio et al., 2013). In addition, negative emotions are mostly lateralized in the left amygdala, while positive emotions activate both amygdalae. These differences between the right and the left amygdala might affect its functional connectivity with other brain regions and further influence the process of emotion regulation.

This study intends to examine the relationship between amygdala functional connectivity and age in a sample of 5-9-year-old children. According to our hypothesis, both the right and the left amygdala intrinsic functional connectivity (iFC) to the PFC would decrease with age in children within the age range of 5-9. Many studies have been conducted that compare the amygdala connectivity between children and adult groups. However, there are limited studies that examine connectivity across age in this age group. Children in this age range go through drastic developmental changes such as maturation of brain’s affective systems. These changes result in the formation of many important neural circuitries that play an important role in emotion reactivity and regulation (Qin et al., 2012). It is important to observe how these age-related changes help children to develop into psychologically healthy young adults.

Methods

Participants

The sample consisted of 39 typically developing children (TDC) between the ages of 5-9 (M=7.616), out of which 77.5% (n=31) were boys. Participants completed functional MRI scans as part of a larger study of emotion regulation in children. Children were excluded if they exhibited evidence of any DSM-IV diagnosis except specific phobia and enuresis/encopresis which are common in this age group.

Clinical Assessment

During a clinical evaluation the parents or the primary caregiver were asked to complete many measures about their child including the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997), which is the measure that will be used in these analyses. This questionnaire is comprised of 24 questions rated on a four-point scale (Never=1, Sometimes=2, Often=3 and Almost Always=4). Two subscales emerge from this measure: Emotional Lability/ Negativity and Emotion Regulation (Suveg et al., 2004).

Scan Procedures

Approximately one week prior to imaging children participated in one or more “mock” scan session(s) in which they were taught how to stay still in the scanner while watching a movie and practicing the resting-state scan. Imaging was performed using the NYU Center for Brain Imaging Siemens Allegra 3.0T Scanner (Siemens; Iselin, New Jersey). Children completed a 6-minute resting-state scan for which they were instructed to “stay as still as a statue” while they looked at a white cross on a back background. The scan comprised 180 contiguous whole-brain functional volumes, acquired using a multi-echo echo planar imaging (EPI) sequence (repetition time = 2000 ms; echo time = 30 ms; flip angle = 90°; 33 slices; matrix = 64 x 64; voxel size = 3 x 3 x 4 mm). To minimize data loss, two EPI sequences were obtained when possible. For spatial normalization and localization, a high-resolution T1-weighted anatomical image was also acquired using a magnetization prepared gradient echo sequence (MPRAGE, TR = 2500 ms; TE = 4.35 ms; TI = 900 ms; flip angle = 8°; 176 slices; FOV = 256 mm).

Imaging Analyses

Functional Image Pre-processing. All brain data pre-processing and group analyses were conducted using an alpha version (0.3.9) of the Configurable Pipeline for the Analysis of Connectomes (CPAC; http://fcp-indi.github.io). CPAC is a configurable open-source, Nipype-based (http://nipy.org/nipype/), automated processing pipeline for resting state functional MRI (R-fMRI) data. Pre-processing consisted of slice time correction, 3D motion correction (24 parameters; Friston et al., 1996), despiking (removal of extreme time series outliers), spatial smoothing (FWHM = 6mm), mean-based intensity normalization of all volumes by the same factor, and temporal bandpass filtering to isolate the low-frequency BOLD fluctuations of interest. Functional image registration was completed using Boundary Based Registration as implemented in FSL (Greve & Fischl, 2009). Structural images were registered normalized to common stereotaxic space (Montreal Neurological Institute: MNI) using Advanced Normalization Tools (Avants et al., 2011; http://www.picsl.upenn.edu/ANTS). Single participant nuisance regression included 24 Friston motion parameters (Friston et al., 1996) and five CompCor signals (Behzadi et al., 2007).

Amygdala Region of Interest Analysis. Given our interest in the amygdala, a region-of-interest (ROI) was selected from a standard atlas called the Harvard-Oxford atlas. The mean time series of this ROI was calculated by averaging the time series of all contained voxels. For each participant the amygdala connectivity strength was assessed using a whole brain analysis that involved correlations between the amygdala ROI time series and all other voxels in the brain. Group-level analyses were conducted using a random-effects, ordinary least-squares model, including age and two nuisance covariates (gender, and
mean frame-wise displacement). Finally, SPSS was used to find significant correlations between iFC of regions showing age-related amygdala functional connectivity and ERC scores.

**Results**
A significant relationship was observed between age and the Intrinsic functional connectivity (iFC) of the right amygdala with the left amygdala and surrounding areas including the parahippocampal gyrus (Image 1). Specifically, decreased iFC between these areas was associated with increasing age (Figure 1). No age-related changes were observed for amygdala-PFC iFC and no significant age-related changes in functional connectivity were observed for the left amygdala. Post-hoc analyses revealed that the right amygdala iFC with the left amygdala was correlated with the ERC Lability/Negativity scale (Figure 2) \((r=0.32, p=0.04)\), but not the ERC Emotion Regulation scale \((r=-0.13, p=0.44)\).

**Discussion**
The goal of this study was to examine how amygdala intrinsic functional connectivity (iFC) changes with age in healthy children in the age range of 5-9. The results demonstrated a decrease in iFC of the right amygdala with the left amygdala and adjacent regions such as the parahippocampal gyrus with increasing age. No significant age-related changes in iFC were observed for the left amygdala or between the amygdala and prefrontal cortex as hypothesized.

Previous studies have not demonstrated age-related decreases in the homotopic iFC of the amygdala. However, the significance of the amygdala lateralization in emotion regulation has been widely discussed. According to the biologically oriented theories, the right amygdala is responsible for processing unconscious emotional stimuli, while the left processes consciously processed stimuli (Baeken et al., 2014). In addition, the right amygdala plays a major role in stimulus recognition, while the left in stimulus evaluation. Furthermore, in adult women, a stronger left than the right amygdala iFC with the vmPFC, more specifically the subgenual anterior cingulate cortex, has been found (Baeken et al., 2014). The right amygdala demonstrated stronger iFC with the DLPFC and the orbitofrontal cortex (OFC) than the left amygdala. Interestingly, the left amygdala demonstrated stronger functional connectivity with brain regions that are involved in implicit emotion regulation, while the right amygdala with brain regions involved in explicit.

The study mentioned above can be linked to the results obtained in this study. Decreases in iFC between the right and the left amygdala with age in children could be viewed as a neuronal mechanism of developing separate functional networks implicated in implicit and explicit emotional regulation. As implicit and explicit emotion regulation strategies become more developed with age, it could potentially cause further amygdala lateralization and development of distinct neural circuitries. However, results obtained only in women is not enough to make any definite conclusions since according to previous studies, a person’s gender can have a substantial influence on amygdala lateralization (Andreano et al., 2009). Therefore, longitudinal studies involving both genders with wider age ranges is needed to observe further bilateral amygdala iFC differences.

**Conclusion**
Additional analyses of this study revealed that the right amygdala iFC with the left amygdala correlated with the ERC Lability/Negativity scale in typically developing children. These results...
RESULTS

The obtained results suggest that bilateral iFC of the amygdala may play a role in decreased emotional lability across this age range. Therefore, decreased amygdala functional connectivity can be considered a necessary process for healthy cognitive development. Further studies that analyze bilateral iFC in children with ADHD should be conducted to observe any difference in amygdala functional connectivity.

Since amygdala-PFC functional connectivity has a central role in emotion regulation, we hypothesized to see its significant change with age. However, the obtained results did not demonstrate any significant change in amygdala-PFC functional connectivity. Two possible explanations are the small sample size and too narrow age range. In addition, the sample consisted of 77.5% of boys, which might have substantially affected the obtained results.

In conclusion, this study demonstrated a unique developmental shift in amygdala iFC in children ages 5–9. More specifically, the obtained results point out the significance of decreased functional connectivity of the bilateral amygdala for decreasing emotional lability in children. Examining the process of developmental maturation of neural circuits involved in emotion regulation represents a necessary step for understanding affective disorders in children and adolescents.

Acknowledgements

Special acknowledgement to Dr. Amy Roy who was more than just a mentor. It was under her guidance that this research became a reality.

Resources

Engineering for Humanity: Improving Current Models of Prostheses Using Three Dimensional Printing Techniques

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Exploring the rapidly expanding field of lightweight and cost-effective prostheses, this project uses three dimensional printing to create alternate designs of the e-NABLE Raptor Hand and Flexy Hand to create a prosthetic hand that provides the user with a greater range of movement. This research began with the construction of individual three part fingers, followed by a palm, wrist and forearm. Modified Arduino code enabled motor rotation providing rudimentary finger movement. For improved coordination, a Myoware muscle sensor was later implemented. Lastly, a heart rate monitor was added in to record supplementary user data for a cohesive prosthetic.

Introduction
Research in the ever-growing field of prostheses is particularly important because the demand for functional yet comfortable devices has skyrocketed, as there are approximately 1.9 million amputees in the United States. Birth defects, severe diabetes, bone cancer and traumatic accidents are the leading causes for limb prostheses. Additionally, there is also a high demand for prosthetic devices from the Veterans Administration: the VA Healthcare system has an estimated 40,000 individuals obtaining care to regain their lost mobility. Aside from clinical use, prostheses also serve the industrial community. Implementing such would allow robots to cut down on the number of factory workers losing limbs while working in hazardous conditions.

Each year roughly 185,000 amputation surgeries are performed, with only 200 clinics servicing the increasing number of amputee demands; thus, alternative approaches to prosthetics are necessary. Such statistics are partially attributed to the expenses of manufacturing and acquiring such devices. Non-functional cosmetic hands range from $3,000 to $5,000, while myoelectric hands cost around $30,000. Recently, it has been found that three dimensional printing provides inexpensive prostheses that are lightweight, durable and functional, solving this issue of limited accessibility of traditional prosthetics.

Background
For the development of our prosthesis, we utilized a type of three dimensional printing, known as fused deposition modeling. First, a form of plastic, referred to as filament, is loaded and fed into the machine, as the printer heats up to its optimal temperature (around 180°C) needed to soften the filament. When temperature is reached, the material becomes pliable enough for the extruder to dispense it onto the printing platform. Next, the drive wheels force the filament into the extruder, and a preliminary support in the shape of the object is printed on the base of the platform. Each layer of the print is added and cooled until the whole print is completed, finishing the process. It is important to note that there are two primary kinds of filament: ABS (Acrylonitrile Butadiene Styrene) and PLA (Polylactic Acid). While ABS also requires a heated platform, it has a greater tendency to curl up and lose its form compared to PLA, usually depending on the angle of precision of the printed object. Dissolvable filament can also be used as a support material, and in a solvent such as D-limonene, can be removed, providing a printed object free of excess matter. Regardless of the material used, the printing process is the same. Fused deposition modeling allows more prototypes to be created rapidly, aiding in the lab’s goal of designing affordable, yet functional prostheses while also understanding the engineering mechanics of modeling and simulation essential to prosthetic manufacture.

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With regard to the electronics associated in this research, muscle sensors use surface electromyography to read and record the different voltages found across a given muscle. This technique uses electrodes to gather the voltage information upon muscle flexing and relaxation to control hand movement with the support of both the Arduino Micro and servo motors. Upon muscle flexing, an increase in voltage will develop, and with the support of both the Arduino Micro and servo motors. Modified Arduino code enabled motor rotation providing rudimentary finger movement. For improved coordination, a Myoware muscle sensor was later implemented.

Lastly, a heart rate monitor was added in to record supplementary user data for a cohesive prosthetic.

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Furthermore, a heart rate monitor or ECG (electrocardiogram), a device that reads surface potentials generated by the electrical activity of the heart, was incorporated into the design. At rest, the heart has a potential difference of 90mV. Thus, this polarized membrane forms an electrical double layer with the inside negative to the relative of the outside. As the heart receives electrical signals from nerve cells, the membrane becomes permeable to outside positive charges. As a result, the separation of charge vanishes, leading the membrane to become “depolarized” causing the heart to contract. Three electrodes are placed onto the patient (at the limbs and over the heart) to measure voltage differences over time. After a few cycles, the produced signal was transferred to an amplifier for processing.
IMPROVING PROSTHESSES USING THREE DIMENSIONAL PRINTING

and later output in graphical format.

Methods
All files were created with the computer aided design program, SolidWorks, and saved in STL (stereolithography) format that were then inputted into the Makerbot software for the printing process. Initially, individual three part fingers were sketched, and then printed in the Makerbot Mini Three Dimensional Replicator. Seen in Figure 1, the finger design featured internal channels for string to pass through, which would eventually attach to: a motor, a moveable joint made up of two spiked protrusions with holes that hug each spike, as well as an additional channel for a pin to fix each of the fingers to the palm.

Several finger models were tested to determine which design provided the most movement when the string was pulled. The thumb was designed as a scaled down version of the other fingers. The bottom of each of the fingers was also further sculpted using the Dremmel rotary tool to provide additional movement.

After the fingers were printed, the palm was then constructed, whose design was to prevent fingers from moving backward by creating a printed rectangular stopper. In addition, a moveable joint, designed much like the finger joints, was created to mimic the opposable thumb action of a human hand. This joint is composed of a rod with two impressions that hold the rod in place allowing motion.

The pins were then designed and printed to a size of 1mm smaller than the holes of the finger in order to slide into the channels and hold the finger in place. The fingers and palm were assembled and a forearm was created to house the electronics and servo minimotors. Several arms were designed, and the final one provided the most surface area.

Next, two Arduino Micros were programmed to provide motor movement using the modified sweep function for 180 degree rotation, pulling on the taut individual finger strings. The preliminary circuitry was first tested using a breadboard. The red, black and orange wires, corresponding to the motor, were placed on the 5V pin, ground pin and 9 pin respectively, and powered by 3.7V batteries. The two forward strings were tied together and the back two strings were also tied together. Each single string from the front and the back were then tied to the two sides of the motor to provide up and down finger movement.

While this arrangement was functional, the motors were not moving in a smooth fashion, creating unreliable finger movement, until the addition of a Myoware muscle sensor. The various connections between the muscle microcontroller and sensor were first established: the ground and 5V pin, along with the analog 0 pin and RAW pin. Once this setup was tested, the modified analog read serial delay Arduino code was uploaded so that the two would interact with each other. Powered by a computer USB, the muscle sensor sent data to the microcontroller, and using Processing and CoolTerm, as well as Excel, voltage-time plots were generated. After determining a proper threshold value, the microcontroller and muscle sensor combination were added to a servo minimotor that would then be tied to a three dimensional printed finger. Once the finalized code for the motors, muscle sensor and microcontroller was uploaded, the fingers would open and close upon user forearm contraction and relaxation.

The heart rate monitor was then implemented utilizing a similar approach. First, connections between microcontroller and heart rate sensor: pin 11 with LO+, pin 10 with LO-, analog 0 pin with the output, ground with ground and power with the 3.3V pin were tested. Since the Arduino Pro Mini board was used instead of a larger board that directly connected to the computer USB, an adapter was needed. Thus, a Sparkfun 3.3V breakout board was added. The Arduino code was then modified and uploaded so that heart rate voltage was recorded over a given period of time. Once the connections were working properly and data was recorded, the prototype was soldered to a circuit board. These circuitry elements were then placed on the elbow of the device.

The complete prosthetic in Figure 2 has fingers with a total length of 83.5mm, and the thumb of 53.5mm with widths of 7.5mm and 4.5mm respectively. The length and width of the final arm that houses the servo minimotors are 174mm and 69mm respectively. Fingers, wrist, pins and forearm were printed, with the palm printed from dissolvable filament for the supports.

With the addition of the muscle sensor, whose final setup is depicted in Figure 3, the prosthetic above was able to accomplish coordinated open and closed finger motion. The user would
Figure 3. Final muscle sensor set up powered by 6V batteries, controlled by an Arduino microcontroller for motor rotation and ultimately coordinated finger open and close.

Figure 4 demonstrates three muscle contraction and relaxation cycles occurring over four fifteen second intervals. Here, the threshold voltage was set to 750mV with a 150 microsecond delay response to capture the cycles in graphical format. Each contraction produces a voltage increase, causing the motors to rotate 180 degrees. While subsequent muscle relaxation produces a decrease in voltage and rotation of motors 180 degrees back to their original positions.

Once the biomedical sensor pad leads were plugged into the sensor, shown in Figure 5, and placed on various points of the body, this device recorded the voltage differences over a test period of eight fifteen second intervals with a 50 microsecond delay response time, shown in Figure 6.

Figure 5– Finalized circuitry for heart rate monitor: sensor, Arduino Pro Mini, USB adaptor (from left to right).

Figure 6– Heart rate data over eight fifteen second intervals vs. voltage differences during cardiac cycles.

While the threshold value was set at 650mV, the various, sudden increases of the plot appear as though the microcontroller is recording other voltages as well. Thus, it is possible that the sensor inadequately suppressed background noises that interfere with the recognition of voltages. However, this graph still demonstrates the cardiac cycle and its various phases of polarization and depolarization that occur as the heart contracts and relaxes over a fixed period of time.

Conclusion

Three dimensional printing is an affordable method of producing functional, yet lightweight myoelectric prostheses. This research serves as a prime example of engineering prototyping, utilizing three dimensional printing, Myoware muscle sensors and heart rate monitors, that will someday help others in need. The future goal of this project is to improve grasping capabilities by adding additional muscle sensors such that each finger is controlled by a single sensor for increased power sent to the servo minimotors. Hopefully others will conduct research similar to this study not only to understand the complex engineering processes, but also to contribute to the burgeoning three dimensional printed prosthetics community at large.

References

Toxicity of Glyphosate, Decylamine, and Copper to Horseshoe Crab Embryos

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The rise of glyphosate-based herbicide use in the United States has grown extremely quickly since the decrease in use of DDT. Glyphosate, Roundup®’s active ingredient, has become the common household herbicide. However, the physiological effects of glyphosate and its surfactants are largely unknown. Copper, another pollutant, has been shown to have toxic effects on aquatic life. Even less is known about the combined effect of these pollutants. This study used horseshoe crabs as a bioindicator. Static renewal bioassays were used for the experimental design. The embryos were collected from Jamaica Bay, Brooklyn and exposed to the pollutants for either 24, 48, or 72 hours and then observed for mortalities. The results showed that neither glyphosate, decylamine, nor copper had large adverse effects on horseshoe crab mortality. These results facilitate the need for continued toxicity studies and hopefully provide the push for regulation of chemicals within the environment and ecological preservation.

Introduction

Jamaica Bay is an urban estuary located in the New York City area (Fig. 1). The bay does not connect to any major rivers in the area, but it does receive runoff from sewers, storm sewers, and treatment plant waste (Botton et al. 2006). The shoreline features include salt marshes, tidal mudflats, and sandy beaches. The bay currently receives its greatest influx of water from water treatment plants and sewers (Botton et al. 2006). Despite the water being polluted, the bay is still home to abundant diversity. Some examples include Ilyanassa obsoleta, Malaclemys terrapin (Duncan and Burke 2016), and Larus atricilla (Dolbeer et al. 1997). One of the species that calls this area home, and is the focus of this experiment, is the American horseshoe crab, Limulus polyphemus.

Figure 1. Aerial view of Jamaica Bay, Brooklyn where field work was conducted for this study.

The importance of tracking the levels and movement of pollutants in an environment cannot be underestimated. Toxicants can exist in the environment in either the gaseous, liquid, or solid states and can easily be absorbed by organisms. Aquatic systems are extremely sensitive to pollutant absorption, as the toxicants can remain stored in the sediment for extended periods of time. The toxic particles are released into the water and are then picked up by organisms and stored in their tissues. The levels of toxicants in the tissues of animals or humans can rise with enough consumption of affected organisms in the lower trophic levels (Botton 2017). This is referred to as biomagnification.

A useful method for evaluating the impacts of humans on their environments is through the examination of bioindicators. Bioindicators are organisms whose physiology, habitat, and behavior are studied in order to better understand the level of change in their environments. Results of such studies can be used as models and applied to larger scale ecosystem projects. Limulus polyphemus is considered to be a good example of a bioindicator due to its well-known physiology. Furthermore, horseshoe crabs are a tolerant and hardy species. They have been found as far back as about 445 million years ago (Rudwick and Thompson 2003). According to the International Agency for Research on Cancer, glyphosate can be categorized as a class 2A human carcinogen (2015). Ironically, commercial formulations, such as Roundup, have become common household products. The mechanism of action for glyphosate is observed to be the inhibition of the enzyme 5-enolpyruvyl shikimate-3-P synthetase. This pathway is crucial to amino acid synthesis in...
plants and to bacteria located in human intestines. Literature has shown that glyphosate does not harm animals, since they do not possess this pathway and since glyphosate, in theory, does not accumulate (CWQG 1999; EPA 1993; Giesy et al. 2000; NRA 1996; WHO 1994 as cited by Kissane Z and Shepard J 2017; Solomon and Thompson 2003). However, in soil, it has been found for up to four to eleven days, and up to four months in aquatic environments (Edwards et al. 1980; Pérez et al. 2011 as cited by Kissane Z and Shepard J 2017). Thus, while short-term toxicity is not of great importance, the long-term effects of glyphosate on the environment, and on humans, is still largely unknown.

Roundup also contains polyethoxylated tallow amine as an inactive ingredient, which is used as a surfactant to greatly enhance the efficacy of glyphosate. It is possible that the inactive ingredients are more toxic than glyphosate, the active ingredient. Previous studies on polyethoxylated tallow amine have observed that the surfactant causes the rupture of cell membranes (Benachour and Séralini 2009; Mesnage et al. 2015 as cited by Kissane Z and Shepard J 2017). The commercial formulation of Roundup is proprietary, and therefore it was not possible to directly isolate and test the effect of polyethoxylated tallow amine on the horseshoe crabs. Decylamine was instead substituted. Decylamine is still a significant and relevant amine surfactant to study due to its simpler structure. In theory, if this simpler compound could harm the horseshoe crabs, then that would potentially translate to a greater harm from the polyethoxylated tallow amine.

It was hypothesized that the horseshoe crab embryos exposed to higher concentrations and prolonged exposure times of Roundup and decylamine would exhibit inhibited growth and higher mortality rates.

Another pollutant evaluated in this study was copper. Copper is important to the physiology of Limulus polyphemus. Small amounts of it are metabolically important for hemocyanin production and enzyme function (White and Rainbow 1985). It has been shown that elevated levels of heavy metals such as copper can be detrimental to an organism’s health. A previous study in 2015 showed that horseshoe crab embryos were only affected by copper levels starting at 100 mg/L (Hamilton et al. 2015). This study also observed slower embryonic development at sublethal levels. An additional study showed that copper caused a small number of embryos to be malformed (Ito et al. 1998a). On the other hand, it has been shown that even at concentrations of 100 mg/L limb regeneration was not inhibited (Ito et al. 1998b).

It was hypothesized that the horseshoe crab embryos exposed to greater concentrations of copper would have lower rates of survival compared with seawater controls.

Methods
This experiment was conducted using horseshoe crabs collected from Jamaica Bay, Brooklyn, during the breeding season of May and June 2017. The horseshoe crab eggs were collected from the sand (at low tide) through the use of 5 cm. and 20 cm. long cores (diameter = 3.8 cm.) and transferred to Fordham University. The cores were sieved using a 1-mm mesh screen in order to separate the eggs from the sand and debris. The collected eggs were then cultured in glass finger bowls containing Instant Ocean Artificial Seawater (20 psu). Once the embryos reached stages 18–20 of development, they were deemed ready for experimentation. Stage 18 embryos were identified as such through the use of dissecting microscopes (Fig. 2). After an embryo’s initial molt, it is considered in stage 18 (Sekiguchi et al. 1988a as cited by Botton et al. 2010).

The embryos were sorted into 90mm-diameter plastic laboratory petri dishes, with 40 embryos per dish. Two dishes were filled with about 30 mL of only artificial seawater and served as controls. The remaining dishes were filled with about 30 mL of artificial seawater containing the experimental pollutants. The dependent variable was the percent survival of the embryos in each dish.

The independent variables used were the different concentrations and exposure times. Nominal concentrations of copper (CuSO₄), Roundup, and decylamine were chosen and then made up as stock solutions. For the copper exposure experiments, five concentrations were chosen: 0.01, 1, 10, 50, and 100 mg/L. For the Roundup treatments, dilution concentrations of 0.025%, 0.05%, 0.075%, 0.10%, 0.15%, 0.50%, and 1.00% were made. The decylamine concentrations were 0.01%, 0.10%, and 1.0%. The 1.0% concentration of decylamine was chosen as the maximum concentration because the proprietary formulation of Roundup was labeled in a manner that suggested that 1.0% might be a relatively high concentration to test.

The horseshoe crabs were exposed to their designated concentration of pollutant for either 24, 48, or 72 hours. The test solutions were refreshed every 24 hours using pipettes for the duration of each dish’s designated exposure time. Care was taken to use a different pipette for every dish in order to minimize any cross-contamination between dishes. Additionally, every 24 hours, the dishes were checked for numbers of deceased horseshoe crabs. Crabs that didn’t exhibit signs of life were observed under a dissecting microscope for signs of leg movement to confirm mortality. After the 24, 48, or 72-hour exposure periods, the crabs were transferred back to artificial seawater. Once back in the seawater, the dishes had their water refreshed two to three times per week until all the embryos either hatched into the first instar, or died. Percent survival was based on the number of horseshoe crab embryos that hatched into developmental stage 21, or first instar (Fig. 3).

The control dishes were monitored alongside the experimental dishes for any mortalities and had their water refreshed on a similar schedule.
Results

Both seawater control dishes exhibited 100% survival of embryos. There was little to no mortality in horseshoe crab embryos exposed to glyphosate for 24, 48, or 72 hours (Fig. 4–6). There was only one death in the dish containing 1.0% glyphosate. The results for horseshoe crabs exposed to decylamine for 24 hours exhibited only one death in total (Fig. 7). The 48-hour exposure showed the dish containing 0.01% decylamine had less than 25% survival while the two other dishes showed zero signs of life (Fig. 8). There was 100% survival across all the dishes exposed to decylamine for 72 hours (Fig. 9). This was highly unexpected. The results for horseshoe crabs exposed to copper for 24, 48, and 72 hours showed close to 100% survival across most of the concentrations. The dishes containing 50 mg/L copper solution exhibited an inconsistent survival rate of less than 50% with regards to the rest of the dishes (Fig. 10–12).

Thus, based on the data the hypotheses were not supported. The mortality rates of the dishes did not follow the predicted positive linear trends.
Fig 9. Percent survival of horseshoe crab embryos after a 72-hour exposure to decylamine.

Fig 10. Percent survival of horseshoe crab embryos after a 24-hour exposure to copper.

Fig 11. Percent survival of horseshoe crab embryos after a 48-hour exposure to copper.

Fig 12. Percent survival of horseshoe crab embryos after a 72-hour exposure to copper.

Discussion

The purpose of this study was to evaluate the toxicity of copper, glyphosate, and decylamine on Limulus polyphemus. The hypotheses were that the horseshoe crab embryos exposed to higher levels of pollutants for prolonged periods of time would have greater rates of mortality. Based on the data, the hypotheses had to be rejected. It was not possible to calculate LC50’s due to the high rates of survival in most of the dishes.

Glyphosate

The exposure to the Roundup solutions at 0.025%, 0.05%, 0.075%, 0.1%, 0.15%, 0.5%, and 1.0% yielded little to no mortality across all three exposure times (Fig. 4–6). While this did not support the hypothesis, the results are consistent with the literature classifying glyphosate as safe for organisms besides plants, and that any toxicity is isolated. However, there are still studies that show support for harmful effects of Roundup. Sublethal effects on Tambaqui fish in the Amazon presented as inhibited brain AChE function and damage to the gills after acute exposure (Braz-Mota et al. 2015). A study of the effects of glyphosate on Japanese rice fish (Oryzias latipes) did not cause a great amount of toxicity. However, when combined with the rest of the formulation, including the surfactant fatty acid alkanoamide (DA), it proved to be a significant threat (Uchida et al. 2012).

Decylamine

The percent survival results for the exposure to decylamine were extremely unexpected. The crabs exposed for 24 hours and 72 hours exhibited only one death across the board. However, the crabs exposed for 48 hours yielded mortality rates that did not follow the pattern found in the 24 and 72 hour dishes. There was less than a 25% survival rate in the 0.01% dish and 0% survival in the 0.1% and 1.0% dishes. Neither cross-contamination between dishes nor exposure time would account for this discrepancy, as these would have led to additional similar deaths in the dishes exposed for 24 and 72 hours. Furthermore, it is extremely unlikely that all 120 embryos used across these 48 hour dishes came from a bad batch of eggs. The separation of 40 embryos into each petri dish at the start of the experiment was randomized in order to better analyze the effects across the entire batch of eggs collected from Jamaica Bay. It is hypothesized that the embryos exposed to decylamine for 48 hours...
to keep the surfactant properly dissolved within the seawater as it would repeatedly emulsify or separate. Regardless, even accounting for the discrepancy in the 48 hour exposures, the results did not support the hypothesis that decylamine would be extremely harmful or fatal to horseshoe crabs.

While this data did not support the hypothesis, it sets the pace for any future studies on surfactants in weed killers. The embryos that survived exhibited an abnormal beige color in comparison to the rest of the crabs in other dishes. The embryos that did not hatch (in the higher 1.0% concentration exposed for 48 hours) turned a completely opaque, beige color due to the surfactant and exhibited slower developmental limb growth. This is significant because this study used a relatively simple amine surfactant (decyamine). Roundup’s polyethoxylated tallow amine is a much more sophisticated amine surfactant and its effects on horseshoe crabs and aquatic life currently remain largely unknown. It is significant to note that if the hardy horseshoe crab species was negatively affected by decylamine, it is highly likely that other organisms in the same environment would fare even worse. The hepatic damage experienced by the Oryzias latipes is evidence for necessary continued research on the overall toxicity of glyphosate-based weed killers (Uchida, M et al. 2012).

Copper

The copper exposure results, save for the 50 mg/L concentration, showed close to 100% survival across the board. This was consistent with previous studies that showed copper to have minimal affects at the lower concentrations used in this study (Hamilton et. al 2015). The outlier results for 50 mg/L pollutant must be due to an isolated issue with those particular dishes. Similar to the 48-hour decylamine results, it was highly unlikely for these particular dishes to have all come from a bad batch of eggs or become cross-contaminated. However, it remains unclear as to what the actual cause for the unexpected results is. Future studies should continue to look at copper as a pollutant in order to better understand its toxicity.

Conclusion

In summary, based on the results, the hypotheses that glyphosate, decylamine, and copper would lead to both higher rates of mortality at increased concentrations and prolonged exposure times could not be supported. While these results were not in support of the hypotheses, they raise an important question regarding pollutant levels in Jamaica Bay. It is possible that the true concentrations are much greater than the ones tested in this study and for that reason showed little mortality rates.

Limitations of this study included financial constraint and the lack of access to the equipment needed to evaluate the concentrations of glyphosate, copper, and surfactant pollutants in the field of interest. The concentrations decided upon in this study were estimates based on previous literature. Another limitation of this study was sample size. As with all scientific literature, the greater the sample, the more significance attributed to the results. It was not possible to set up replicate dishes for the original 47 in the experimental design as the team did not have enough manpower to assess any more crabs per day than what was done in this experiment. Any replications of this experiment should include replicate dishes in the event that issues arise, such as bacterial infestations. A final limitation was simply the nature of performing experiments on live animals. The horse shoe crabs did not remain in stage 18 for too long and so by the time the team collected the results, it was too late to perform another round of pollutant testing. Testing would have to wait until the next breeding season.

Other potential sources of error in this study include any loss of embryos that might have occurred during water changes. It was not difficult for embryos to be accidentally sucked up by pipettes, and coupled with their translucency, could have easily been washed away. This, or initial miscounting of embryos, due to human error, could have been the source a few missing embryos by the end of the experiment.

Future studies should look at the combination of glyphosate and copper pollutants to analyze whether they have a synergistic negative effect on the horseshoe crabs and other organisms in the environment. It is highly likely that these two pollutants exist in the Jamaica Bay water at similar times. It would also be useful to collect samples of seawater from Jamaica Bay to determine the actual concentrations of copper and Roundup that horseshoe crab embryos might be exposed to. A new essay on glyphosate published in 2017 indicated that the main surfactant, polyethoxylated tallow amine, found in Roundup, can make up to 30% of the entire formulation (Sinochem Australia 2013 as cited by Kissane Z and Shepard J 2017). In light of this information, additional studies on the effect of surfactants in aquatic environments must be conducted for comparison with the decylamine patterns found in this study. Companies that have a large influence on the environment through their products have a responsibility to transparency. Transparency will be the only way in which scientists can accurately evaluate the safety of our every-day products. This and subsequent studies should be used to help create desperately needed new water regulation laws or habitat restoration in the bay area.

References


Black Female Performers in a Pornified World: Defying Respectability Politics One Video at a Time

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In recent years, mainstream media content has become more explicitly sexual, a shift some scholars refer to as “pornification.” Pornification scholars often note the ways in which this trend might serve to justify discrimination and violence against women. However, these scholars often analyze the issue from a single-axis framework by exclusively looking at the ways in which pornification affects white women. This paper analyzes the ways in which explicit expressions of sexuality differ for women of color by considering a racialized history in which Black women did not have ownership over their own bodies and sexual expression. I specifically evaluate music videos by Black female artists and locate examples in which Black women in music, such as Beyoncé and Nicki Minaj, simultaneously offer up conventionally sexy images while also challenging assumptions about Black women and Black sexuality. As such, I argue that music videos in which women of color are seen as “pornified” might actually serve the purpose of creating a space in which women can negotiate dominant discourses surrounding Black women’s sexualities with genuine expressions of desire.

In recent years, mainstream media content has become increasingly sexualized, and the line between porn and non-porn has become blurred. Some scholars refer to this phenomenon as “pornification,” and many believe that sexual media content, and the pressure on women to behave like porn stars—always attractive and sexually available—harm women by objectifying them and thus sets them up to be victims of violence and abuse. However, this line of reasoning put forth by scholars of pornification rests upon a set of unacknowledged assumptions about race, gender, and sexuality that I will work to draw out in this paper. The experiences of Black women—both in recent years and throughout history—are very different from that of white women. The disparity between these experiences reveals that pornification discourses are premised upon white normativity; one cannot be pornified if the default assumption is that one is already hypersexual, which is the historically-held assumption about Black women. Through analysis of Black female pop and hip-hop stars, this paper will show how Black women create spaces in which they can negotiate dominant messages with messages conveying their own sexual desire and expression. In this way, sexualization within media texts created by Black women can sometimes dispute constructions of racialized sexuality, thus challenging pornification discourse by exemplifying the ways in which pornification can be a valuable manner of expression for women of color whose sexualities have historically been controlled and dictated by others. Indeed, the idea that Black women even had the option of saying no was barely an acknowledged concept for a large part of America’s history, when Black women’s bodies were literally seen as the sexual property of white slave-owners. Pornification arguments are simply not universal, and we must take a closer look at how an increasingly sexualized world particularly affects the Black women living in it.

Pornification—the overt sexualization of mainstream content, or the blending of pornographic content with mainstream content—is hard to deny. The kind of mainstream content to which we are now accustomed would scandalize most viewers in the 1950s. The fear that such pornification justifies violence against women and girls is often discussed. However, this position, while certainly merited, misses much of the story. The intersection of gender and race does not get nearly enough attention in the popular conversations and texts surrounding pornification. Indeed, the idea that there ever was a clear line drawn between “porn” and “non-porn” is itself based upon ideas about race and class, as the perception of Black hypersexuality inherently excludes Black women from the “non-porn” realm. For example, the advent of Playboy magazine is often cited as an important catalyst for pornification. Pornification scholars such as Carmine Sarracino and Kevin M. Scott, as well as Rodger Streitmatter, describe the way the magazine went to great lengths to portray the women featured in its pages as “wholesome” girl-next-door types—a trope inaccessible to women of color. The significance of Playboy according to these authors is that the publication served as a first step towards the sexual objectification of women—but none of these authors indicate that this journey to mainstream sexual objectification was only the journey of white women. Indeed, Playboy did not feature a Black Playmate of the Month until 1965—12 years after the magazine’s conception—and Black models were overall a rarity in its pages. This is because the wholesome girl-next-door narrative was and is still not easily accessible to Black women in the way that it was and still is accessible to white women. The argument that Playboy helped to turn women into sexual objects in American culture ignores the fact that Black women were already seen as objects.

As a consequence, when scholars trace the mainstreaming of sexual imagery, the resulting history often represents a single-axis framework—only the experiences of white women are considered. Patricia Hill Collins identifies the ways in which Black sexuality has been historically linked to deviancy. According to Collins, “the racial difference assigned to Black people has often come in gender specific forms. In the nineteenth century, women stood as symbols of race and women from different races became associated with differentially valued expres...
BLACK FEMALE PERFORMERS IN A PORNIFIED WORLD

sions of sexuality.”¹ She describes how European nation-states were at the time attempting to define their national identities, with one factor in common: white womanhood and purity were important ideals. In order to uphold the idea that white women’s purity had significance, there needed to be a “corresponding set of ideas about hot-blooded Latinas, exotic Suzy Wongs, wanton jezebels, and stoic native squaws.”² Essentially, European nation-states attempting to define their nationalities as superior inherently needed to define others as inferior. In contrast to their pure and feminine white women, women of color were characterized as uncivilized and excessively sexual. The sexualities of African men were also denigrated as being “dangerous and in need of control,” especially in terms of protecting white women from such a perceived threat to their purity.³ This branding of people of color as uncivilized and animalistic served as a justification for colonialism and slavery, and the perception of Black sexuality as deviant still pervades our society (and pop culture) today.

In Sarracino and Scott’s tracing of the pornification of pop culture, The Porning of America, they argue that such pornification serves as a “crucial part of the oppression of women and a violation of their civil rights.”⁴ While the argument is merited, Sarracino and Scott never consider the different ways in which women of color are positioned differently than white women, who comprise most of Sarracino and Scott’s examples. Sarracino and Scott are misled in their suggestion that “pornified” representations of women have only emerged recently. Their narrative is the result of a single-axis perspective. Pornification arguments presume whiteness, because the idea that women of color are inherently “hot-blooded” and always ready for sexual acts has permeated society for centuries. Akeia A. F. Benard explains that as a result, white women are granted the freedom to experiment with and express their sexualities on their own terms, while Black women are often denigrated when they try to do so because “Black women are defined by their sexuality and as their sexuality.”⁵ In fact, pornified images of women of color are often more intensely violent and hypersexualized than images of white women. Benard argues that even within pornography itself, women of color are often depicted in submissive positions more so than white women: “Black women are often bound, gagged, and/or in chains.”⁶ Can bodies already deemed sexually deviant, then, be pornified in the media in the same way as white women’s bodies? Furthermore, are Black women’s attempts at creating and owning their own sexualized images seen as legitimately empowering by the public, or are these images used to further shame and perpetrate the idea of Black sexual deviency?

Collins notes that the animal skin bikinis worn by the members of Destiny’s Child, a Black girl group comprised of Michelle Williams, Kelly Rowland, and Beyoncé Knowles, in the photo insert for their album Survivor, encapsulate the idea that Black women’s sexuality is wild and animalistic. She likens Destiny’s Child to Josephine Baker, a Black woman who performed in banana skirts for white audiences in Europe in the 1920’s, and Sarah Baartman, who was showcased as an exhibition so white Europeans could marvel at her large behind and tribal garb.⁷ However, while it is unclear if the members of the group picked the outfits themselves, Destiny’s Child is certainly positioned as having agency over their own bodies. The Survivor album contains the songs “Independent Women” and “Survivor,” which are both about maintaining control over one’s own life. While Collins raises concern that their animal skin bikinis might be reminiscent of the idea that Black women are animalistic, I contend that Destiny’s Child’s own lyrics make clear that they are not to be tamed or controlled in any way. The representation of Destiny’s Child mediates dominant imagery with subversive lyrics; their outfits may pay homage to their African roots, but their lyrics make clear that they will not be “tamed” in the way that African women were historically controlled.

Regardless of these narratives of power and independence, however, Collins notes that the continued use of certain imagery, in this case animal imagery, can perpetuate harmful stereotypes about Black women. While the idea that Black women are animalistic and hypersexual continues to pervade our society, specific stereotypes about Black women have evolved to fit the times. As Collins argues, the old “jezebel” stereotype has transformed into the modern stereotype of the Black bitch: “One sign of a ‘Bitch’s’ power is her manipulation of her own sexuality for her own gain. Bitches control men, or at least try to, using their bodies as weapons.”⁸ Though Collins’ book was written in 2004 before Nicki Minaj came onto the scene, her description of the Black “bitch” fits Minaj well. At the end of Minaj’s “Anaconda” video, for example, Minaj is shown teasing the rapper Drake by shaking her booty in his face. Drake is shown sitting in his chair looking distressed, presumably because he is unable to touch Minaj’s body. When he attempts to touch her “buns,” she smacks his hand away and struts out of the frame, leaving Drake alone with his face in his hands. The entire time, Minaj shrinks with laughter: the man’s pain is her game. Certainly Minaj would be classified as a “bitch” under Collins’ definition.

In describing another Black bitch, Lil’ Kim, Collins questions whether Kim—and other women rappers who sell sex—are just the female version of misogynistic rappers. But Collins also notes the importance of the performance of sexuality itself: “To be real, she must sell sexuality as part of working-class Black female authenticity. On the other hand, many African American women rappers identify female sexuality as part of women’s freedom and independence. Being sexually open does not make a woman a tramp or a ‘ho.’”⁹ Minaj, with her dominant messages of independence and empowerment, would subscribe to this line of thinking. However, for Collins, women in hip-hop taking control and freely expressing their own sexualities comes with a consequence: “This issue of control becomes highly important within the universe of Black popular culture that is marketed by mass media. Some women are bitches who control their own sexuality—they ‘get a freak on,’ which remains within their control and on their own terms. Whether she ‘fucks men’ for pleasure, drugs, revenge, or money, the sexualized bitch constitutes a modern version of the jezebel, re-packaged for contemporary mass media.”¹⁰ This means that when women of color claim agency over their bodies and sexualities, “empowerment” is not always the message that is received by audiences. Indeed, Collins argues that when women of color display their sexual agency, it serves as fuel for updated stereo types about Black women. This is why some feminist scholars, such as bell hooks, take issue with the work of celebrities like Nicki Minaj and Beyoncé.

In hooks’ view, women like Minaj and Beyoncé “can exercise control and make lots of money, but that doesn’t equate with liberation.”¹¹ hooks has repeatedly expressed concerns over what sexual liberation truly looks like. About Beyoncé’s “Partition,” in which the singer describes performing sexual acts in the back of a hired car, hooks said, “If I’m a woman and I’m sucking somebody’s dick in a car and they’re coming in my mouth and we could be in one of those milk commercials
or whatever, is that liberatory? Or is it part of the tropes of the existing, imperialist, white supremacist, patriarchal capitalist structure of female sexuality?”

Beyoncé presents herself as a feminist, but many of her representations are highly sexualized. hooks takes issue with Beyoncé’s sexualization; in this way, her beliefs are aligned with feminist pornification arguments. hooks’ comments—and the arguments of pornification scholars—do not take into account the conditions in which Beyoncé makes these artistic “choices”—it seems that hooks has forgotten that the world in which Beyoncé lives is one that is influenced by racialized and sexualized expectations and pressures. Furthermore, the desire to be sexualized, and taking pleasure in one’s own self-sexualization, can constitute an important avenue of sexual expression for women of color whose sexuality has seemingly belonged to everyone but themselves throughout American history.

Music videos by Black women, then, serve as an important method of sexual expression. In her study of 1990s and early 2000s hip-hop music videos featuring Black female musicians, Rana Emerson concluded that Black female artists negotiate Black womanhood in their work by both “capitulating to oppressive social forces” while also resisting them. This ambivalence on the part of Black female artists towards messages about Black sexuality, “namely, the coexistence of hypersexual images and the denigration and denial of the beauty of the Black female body,” leads artists to reclaim sexually explicit representations of Black women. Emerson notes that this self-sexualization may be interpreted as an acceptance of controlling images of Black female sexuality, as hooks contends, but argues instead that “these sometimes explicit representations of Black women’s sexuality actually exemplify a process of negotiating those contradictory and often conflicting notions and, more significantly, represent an attempt to use the space of the music video to achieve control over their own sexuality.” These representations of Black female artists might be classified as “pornified” and therefore accused of perpetuating harmful stereotypes and standards. However, according to Emerson, they can instead be viewed as a mediation of dominant ideas about Black women’s sexuality with Black women’s own expression of sexuality. Indeed, Emerson says that in the videos she studied, there was space in which Black female viewers might “place themselves as subjects of the text.” In these texts, the female performers attain pleasure from their own sexualization, as well as “a certain level of power over these men who are virtually losing control of their faculties as a result of their performance,” which allows female viewers to derive pleasure by placing themselves within the text. The female hip-hop star not only provides sexual pleasure, but “pursues, receives, and accepts it,” thus empowering her fans to do the same.

Even so, some scholars do not see the value in such sexual expressions. For examples, as a response to Minaj’s “Anaconda” video specifically, hooks said, “That’s one of the things that struck me about ‘Anaconda.’ I was like, this shit is boring. What does it mean? Is there something that I’m missing that’s happening here?”

hooks is indeed missing something. Minaj’s “Anaconda” is so noteworthy because it plays up every trope about women of color and hip-hop and throws it back in the media’s face. Everything about the video is exaggerated to the extreme. Minaj’s performance, the sexually suggestive dance moves and gestures, obvious product placement, and even Minaj’s drawn-out laugh at the end of the song suggest that the whole thing is one big joke—and Minaj is in on it. “Anaconda” reveals the racialized nature of sexuality, and many of the criticisms lobbed against Minaj and the video only help to prove the point.

The song samples from Sir Mix-a-Lot’s “Baby Got Back” and specifically repeats over and over the part of the original song in which two white women gape over a Black woman’s behind: “Oh my gosh, look at her butt.” This line alone is reminiscent of the display of Sarah Baartman, in which white Europeans would marvel, poke, and prod at Baartman’s pronounced buttocks. Minaj’s own lyrics play into Collins’ description of the “bitch” who uses her sexuality for financial gain: she describes the men she has sex with buying her Alexander McQueen and Balmain to “keep her stylish,” and says she only let one of the men she describes “hit it cuz he slang cocaine,” thus granting her access to both money and drugs. Minaj proudly and unapologetically describes successfully using men for material gain. An important detail to note is that when she describes the men buying her designer clothing, she is shown modeling the outfits in an empty room—men may have bought her these items, but Minaj is still completely independent.

The video also flips the script on Sir Mix-a-Lot’s original “Baby Got Back.” The other lyric she samples is “My anaconda don’t want none unless you got buns, hun,” which suggests that a) the man has the control over sexual relationships and who he does and does not wish to have sex with and b) likens his own sexuality to the predatory anaconda. Minaj’s video makes clear that she is the one in charge of her sexual decisions: in the final scene, Drake’s “anaconda” clearly wants Minaj’s buns, but she turns him away. It is also worth noting that Drake is the only man present in the whole video, and he only appears in the last minute. Throughout the rest of the video, Minaj and her female backup dancers playfully twerk and smack each other’s butts, but there are no men in sight. This suggests that these displays of sexuality are solely for the women themselves. Contrasting—ly, the dancers in “Baby Got Back” dance sexually, but it is only as the men in the video look on to see if the women “got buns.”

The kitchen scene also serves to exaggerate and parody “acceptable” and “respectable” femininity—namely, white femininity. In the first few seconds of the shot, Minaj looks the part of a housewife ready to make a cake: wearing an apron with her pink hair in a bun, Minaj is the epitome of domesticity. But the shot is interspersed with footage of Minaj twerking in the jungle, and soon, the camera cuts back to the kitchen, where an apron-clad Minaj begins to cover her breasts and butt in whipped cream, an overt and trite sexual innuendo. She even begins to pantomime performing oral sex on a banana. But just when one might to think Minaj is performing for the male gaze, she slices the banana and tosses it away, grimacing at the camera, and effectively cutting off any fantasies of Minaj performing oral sex for the viewer’s enjoyment. This scene in the kitchen is an exceptional parody of white domesticity and the idea of the “proper wife.” Here, Minaj points out that this domestic ideal is constructed in conjunction with whiteness—it is only accessible to white women. This hearkens back to Collins and the idea that white femininity only has value and meaning insofar as there is a deviant construction of others. As long as Minaj might try in the video, she will never be the perfect domestic wife simply because she is not white, and therefore must be sexually deviant—hence the antics with the banana. This short kitchen scene speaks volumes about women of color and their exclusion from a “respectable” status: even if they play the part, Black women can never be respectable because the construction of respectability is reliant upon their exclusion.

Through her work and her public persona, Nicki Minaj rejects
Respectability politics refers to the attempted policing of marginalized communities’ actions by members of the community themselves. In the case of the Black community, respectability politics come in the form of disproving harmful stereotypes about the community, which often includes emulating values of the (white) upper and middle classes. This, in turn, often denies members of the community permission to access to their own identities and pleasure, and contributes to distinctions concerning normativity and deviance, setting up the opposition between “good” and “bad” Black subjects. Evelyn Brooks Higginbotham was the first to coin the term “politics of respectability,” which referred to “African American’s promotion of temperature, cleanliness of person and property, thrift, polite manners, and sexual purity.” The standards for which respectability politics advocates, though, are inherently difficult, if not impossible, for working-class African-Americans to adhere, because they are based upon middle-class ideals of “manners and morals.” While the middle-class Black women who originally put forth ideas about respectability believed these standards could provide both themselves and working-class Black women with respect, working-class women rejected the idea of mimicking middle-class values for the White approval. These women saw the contradictory nature of respectability politics, especially in regard to ideas about abstinence and purity. For them, “sexuality was one of the few realms in which [they] could exercise autonomy, and thus tangibly distinguish themselves as free women both from the sexual exploitation of slavery as well as the demands of having thirteen babies in insular Southern rural families.” Sexual agency, for these working-class Black women, was akin to freedom.

Ideas of denying pleasure and promoting sexual purity in the name of respectability is particularly important when discussing Black sexuality. Many Black feminist scholars reject respectability politics as an actual solution to sexism, racism, and patriarchy. Brittney Cooper of the Crunk Feminist Collective lays out why respectability politics works towards an undesired outcome: “An ascetic radicalism that is averse to pleasure is neither just nor healthy. It may embolden us to create a new world, but that world won’t be sustainable, and it may become more violent than the one we left.” Cooper’s point is that, should respectability politics work to actually change things (which it has not and will not), the change it would facilitate would produce conditions possibly more violent and oppressive. Furthermore, respectability politics has been around for years, and, as Cooper points out, First Lady Michelle Obama, with her Ivy League degrees and impeccable dress, still dealt with racist and sexist criticisms during her husband’s administration. Cooper sums up the problems with respectability well: “Black feminists have long pointed to the limitation of respectability politics, steeped as they are in elitist, heteronormative, and sexually repressive ideas about proper Black womanhood...It is time to face the fact that the more-than-century-long project of respectability politics has been an utter failure, particularly since it hasn’t convinced Black men to treat us any better either.” Furthermore, the women of the Collective “[recognize] that Black women and Latinxs never quite get to occupy the space of American respectability,” which is reminiscent of Collins’ work and the origins of ideas about Black sexual deviancy: women of color can never occupy the space of American respectability because that space is reserved for white women. In order for the white identity to mean something, Black identity must be Othered.

The scholars of the Crunk Feminist Collective, particularly Cooper, have identified a method of counteracting respectability politics, coined by Cooper herself: “disrespectability politics.” It refers to the dismissal of the suggestions of respectability politics through “talking back, vocalizing their anger, or otherwise letting their displeasure be known.” Disrespectability politics is a form of resistance which allows Black women to “push back against too-rigid expectations of acceptable womanhood.” It seems that many Black women in the music industry employ disrespectability politics, whether they know it or not. Nicki Minaj has certainly rejected respectability from the very beginning of her career. Aisha Durham of the Collective describes how Minaj “offers up consumable sex expected of all women, but she does so with a sense of wonderment, levity, and camp that defies how we are used to seeing Black women in commercial media.” Despite Minaj’s display of campy, consumable sex, she still demands the respect of her peers within the hip-hop community, often emphasizing in interviews and in her raps that she can do everything her male counterparts can do and more. In one MTV interview, Minaj asserts that she deserves the utmost respect in the industry not because of traditionally “respectable” attributes, but because she puts her time, energy and effort into her work.

Despite the opportunity for positive readings of sexual images of women of color, such interpretations are not one-dimensional by any means. Celine Perrenas Shimizu addresses the guilt women of color may experience as a result of watching content that plays into stereotypes surrounding their own identities by legitimating the pleasure women of color might take in the creation or viewership of sexualized representations. She argues, as do I, that automatically denunciating sexualized images as demeaning is a one-dimensional approach, and that it is possible for women of color to claim ownership of their sexual desires by enjoying and producing perverse representations. She notes, though, that this negotiation of ideas is not necessarily an easy one. For Shimizu, her “intense pleasures [in sexualized representations] coexist with a terrible pain regarding racialized sexuality.” Despite the pain, this negotiation is important, because limiting understanding of racialized sexuality as “good or bad, abnormal and normal, or right and wrong...may also limit how to enjoy, appreciate, and more fully understand” one’s own sexuality as a woman of color.

Black artists and Black feminist scholars alike realize that sexualization can serve as an avenue to challenge vilifying discourses about their sexualities, and to assert ownership over their own bodies and sexuality. Blanket statements about pornification being harmful to women take on a paternalistic and even chastising tone towards representations of women embracing their sexualities. Expressions of sexuality can be a legitimate method for Black women to juggle their own feelings of sexual desire with the discourses around them claiming that their sexualities must be tamed. By disparaging pornified media and prescribing a course of action to young women to keep themselves un-pornified, pornification arguments are evocative of respectability politics. Pornification scholars push the idea that young women should resist pornified representations without stopping to consider whether these images might bring pleasure to women themselves. Black feminist scholars such as Durham, Cooper, and Emerson argue that the world is not so simple, and while the male gaze and the patriarchy are dominating forces in our world, they are something with which women must contend—it is in this world that they must attempt to seek out pleasure. Following the advice of pornification scholars, it seems, would simply bolster ideas about proper
femininity—which, we know, is an issue for the women of color who are intrinsically excluded. Nicki Minaj, Beyoncé, and their female hip-hop colleagues, then, carve out a space in which they can be sexual in their work, simultaneously conveying the validity of their sexual desires and challenging those who attempt to control it. These artists defy respectability politics by being everything they “shouldn’t” be: loud, assertive, sexual, even sometimes vulgar, while still commanding high monetary compensation and exceptional treatment from those with whom they work; essentially, they reject respectability but still demand (and receive) respect.

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The DNA Damage Tolerance (DDT) pathways facilitate DNA replication of damaging lesions by postponing repair until after DNA replication occurs. This prevents genome instability in healthy cells, but also increases mutagenesis in cancerous cells, especially in the form of extrachromosomal circular DNA (eccDNA). DDT uses DNA Polymerase η (PolH), ligase Rad18, or enzyme Ubc13 to bypass damage and continue replication. In a previous study, our lab eliminated one form of eccDNA, Double Minute Chromosomes (DMs), by disrupting DDT in a model cancer cell line Colo320DM. We hypothesized that decreasing the gene expression of PolH, Rad18, or Ubc13 through small interfering RNA transfection can disrupt DDT and eliminate DMs. We concluded that Ubc13 contributed to eccDNA proliferation, but could not assess the role of PolH and Rad18. After optimizing this protocol, future studies can determine their roles in the maintenance of eccDNA and apply these methods to translational cancer treatment.

Introduction

All living organisms rely on DNA as the instruction manual for vital processes of the cell such as growth, repair, and replication. Healthy human cells have 23 pairs of chromosomes that store DNA in the cell’s nucleus and maintain proper cell development and function. However, cell integrity is constantly threatened during the replication process. The development of DNA-damaging lesions—naturally-occurring abnormalities such as mutations and chromosomal aberrations—can stall replication, leading to DNA loss or cell death.

To maintain replication when lesions are present, the cell activates the DNA Damage Tolerance (DDT) pathways. DDT prioritizes overall cell integrity and genomic stability over immediate repair by postponing repair until after DNA replication occurs (Fig. 1). The ubiquitination of a replicative sliding clamp, known as the Proliferating Cell Nuclear Antigen (PCNA), regulates which DDT pathway will be activated. Monoubiquitination of the PCNA leads to the Translesion Synthesis (TLS) pathway. Specialized TLS polymerases, such as DNA Polymerase η (PolH), use the damaged DNA strand as a template for replication but insert corrected pieces into the copy in place of the damaged sections. Using PolH and ligase Rad18, TLS replaces stalled portions of the DNA and directly bypasses the damaged portions of the DNA. Alternatively, the polyubiquitination of the PCNA activates the Template Switching (TS) pathway. The TS pathway uses the enzyme Ubc13 to indirectly bypass the damage by using the opposing, undamaged strand as a template for replication. If lesions are left unrepaired after replication, mutations can proliferate and result in ‘extra’ DNA, known as extrachromosomal circular DNA (eccDNA).

Forms of eccDNA are found in nearly half of all cancerous human cells. All eccDNA lie outside the nucleus and contribute to cancerous cell growth. In particular, one type of eccDNA, known as double minute (DM) chromosomes, is relevant to cancer studies because it is distinctly visible using a microscope’s magnification and analyzed through the amplification of the Myc oncogene (Fig. 2). Oncogenes like Myc cause healthy cells to undergo uncontrolled cell proliferation and lead to cancer development. Myc is also one of the few oncogenes that is most frequently amplified in cancer cells, making it an appropriate oncogene to monitor. Because of its impact on cancer cell proliferation, the copy number of the Myc oncogene reflects the functioning of DNA Damage Tolerance (DDT) pathways.

In a previous study, our lab focused on the relationship between DM proliferation and the use of PolH to investigate the role of the TLS pathway on the maintenance of eccDNA. We studied this relationship in human colon cancer cells, a Caucasian colon adenocarcinoma cancer cell line known as Colo320DM, because it contained easily-identified DMs and its cell development occurred at relatively quick rates (Fig. 3). We targeted PolH by inserting small interfering RNA (siRNA) into the cell to silence, or limit, the gene expression of PolH; this allowed our lab to see how DM replication changed when PolH was effectively knocked-down, not functioning. With electrophoresis and a western blot, we separated the protein composition by molecular weight then confirmed the knockdown by the absent protein band at the appropriate marker. We then analyzed the copy number of the Myc oncogene as an indicator of DDT function, such that a decrease in Myc implied a decrease in DDT function. We found that the decrease in expression of PolH led to the loss of DM replication (Fig. 2). This loss of DM replication indicated that the TLS pathway was disrupted; the damaging lesions were not replicated through DDT and cancer cell proliferation had decreased. Considering the significant role of DDT in the development and proliferation of cancerous cells, we expanded on the findings of our previous study to determine the roles of both DDT pathways. We targeted components of the TLS and TS pathways and then studied their effects on DDT function. We hypothesized that decreasing the gene expression of PolH, Rad18, and Ubc13 through small interfering RNA transfection will disrupt DDT and eliminate DMs. The purpose of this study is to investigate the effects of eliminating one mechanism of cancer cell proliferation, namely DDT. Understanding potential methods...
of disrupting cancer cell development and proliferation has implications on future translational cancer treatments.

**Methods**

We maintained cultures of the Colo320DM cells in a media of RPMI 1640 2mM with 10% Fetal Bovine Serum (FBS). Before treatments, we used a pipette to draw and release these semi-adherent cells from the well plate in order to ensure uniform composition when transferring the cells between treatments. We used untreated Colo320DM cells as controls for the analysis. All cells were stored in an incubator at 37°C.

**siRNA Transfection**

In order to silence the target genes, we mixed the Colo320DM cells with the respective type of small interfering RNA (siRNA) then inserted the mixture into the Neon™ Transfection Chamber (Fig. 4). We electroporated each sample, sending a single short electric pulse at 1700V in 20ms to induce a voltage across the cell membrane. This created an electric field to allow the siRNA to enter the cell and effectively silence the expression of the components of interest: PolH, Rad18, or Ubc13. We then transferred the cells into labeled well plates of warmed media and incubated them at 37°C.

**Cell Preparation**

To begin the isolation of protein and DNA for analysis, we transferred our samples into microcentrifuge tubes and centrifuged them at 1500 rpm for five minutes. We aspirated the supernatant, washed the pellets with phosphate-buffered saline, and prepared the samples for either protein or DNA extraction and analysis.

**Protein Preparation for Analysis**

We measured protein concentration using a Qubit™ Fluorometer. Depending on the protein concentration, we added 20-30µg of each transfected protein per lane to a 1.0 mm, 10-well Bis-Tris Protein Gel. Through gel electrophoresis, we separated the composition of proteins based on their specific molecular weight. Next, we transferred the gel onto a nitrocellulose membrane and ran a Chemiluminescent Western Blot Immunodetection using the appropriate antibodies: Mouse IgG antibodies for PolH, and Rabbit IgG antibodies for Rad18 and Ubc13. After imaging the membrane, we used a molecular weight protein ladder to determine if the PolH, Rad18, or Ubc13 proteins were expressed or considered knocked-down. In untreated Colo320DM cells, we expected to see PolH protein weigh in at 80kD, Rad 18 at 55kD, and Ubc13 at 17kD.

**DNA Preparation for Analysis**

We isolated DNA from transfected cells using the GenElute™ Mammalian Genomic DNA Miniprep Kit and protocol. With a Qubit™ Fluorometer, we measured DNA concentration then used a quantitative polymerase chain reaction (qPCR) to determine the gene copy number. Next, we calculated a standard for the qPCR efficiency to determine validity of data; we set the ideals of E = 2 and E% = 100% to signal perfect doubling of PCR product per cycle and to indicate the validity of our results. We analyzed relative normalized expression of the Myc oncogene compared to the unaffected Chromosome 17 control to determine changes in DM detection.

All procedures were conducted in the laboratories of the Department of Surgery in the Barbara & Marvin Davis Research Building at Cedars-Sinai Medical Center in Los Angeles, California from June to August of 2017.

**Results & Discussion**

**Protein Analysis**

In the protein analysis, we compared the bands for each variable. Lack of bands on the Western Blot at the respective weights of the variables would indicate successful silencing, or knockdown: PolH at 80kD, Rad 18 at 55kD, and Ubc13 at 17kD. We found that the faint band at 17kD in the Ubc13 column suggested that the siRNA transfection was successful in knocking-down Ubc13. However, the dark bands at 80 and 55kD, respectively, showed that PolH and Rad18 were not knocked-down.

**DNA Analysis**

Looking at the effects of the Ubc13 knockdown, we compared the copy number of the Myc oncogene to the unrelated Chromosome 17. Our Cq values represent quantity of amplification cycles required to quantify our target genes (Graph 1; Graph 2) The fact that the Cq levels of our samples were within the standards suggests the validity of our data. We focused on Myc as a marker for DM proliferation, then compared it to the copy number to Chromosome 17, which is unaffected by DMs. Relative to the control, the quantity of copy number for both Chr17 and Myc decreased within each respective treatment, compared to the control (Graph 3). However, the copy number of Myc oncogene compared to Chr17 did not decrease in cells with Ubc13 knockdown but increased nearly threefold (Graph 4).

**Conclusion**

Our siRNA transfection-mediated knock down successfully silenced Ubc13 but did not knock down PolH and Rad18. Therefore, we focused on the results of the Ubc13 knockdown. We recognized that the copy number of the Myc oncogene did not decrease as we expected; it increased threefold for the Ubc13 knockdown. Because Ubc13 is found only in the Template Switching (TS) pathway of DNA Damage Tolerance (DDT), this finding implies that the TS pathway plays a role in proliferating eccDNA, rather than maintaining or eliminating them. In addition, we were not able to evaluate the role of the Translesion Synthesis pathway (TLS) of DDT because we could not knock down its related components, PolH and Rad18. We speculate that the TLS pathway may play a more dominant role in the maintenance of eccDNA based on our lab’s previous study. Based on our lab’s previous study, we found that the knockdown of PolH resulted in the elimination of eccDNA, specifically DMs. Considering our current results about the role of Ubc13, it is likely that the TLS pathway plays a greater role in the maintenance of eccDNA such as DMs. We plan to improve our siRNA knockdown for PolH and Rad18 to confirm our hypothesis.

In order to optimize the protocol, we can adapt different variables in future experiments. The extension of this experiment can investigate the efficiency of the siRNA transfection by increasing the voltage of electroporation or increase the quantity of siRNA introduced. Another technique to inhibit protein functions of PolH, Rad18, and Ubc13 would be to use chemical inhibitors. Moreover, we could also target other, similar components of DDT, such as Rad6 or other forms of DNA polymerase in the TLS pathway or Rad5 in TS pathway to determine alternative approaches to inhibiting eccDNA proliferation. Additional variations of this experiment may be able to eliminate DDT pathways and prevent proliferation of cancerous cells,
THE ROLE OF DNA DAMAGE TOLERANCE thereby developing a potential future translational cancer treatment.

After optimizing the protocol to effectively knock-down PolH, Rad18, and Ubc13, we will be able to evaluate the significance of their roles in maintenance of eccDNA. Because eccDNA is found in many human cancer types, the ability to eliminate eccDNA like DMs can be used as the basis for future translational medical procedures for cancer treatment. This study may provide evidence for preventing cancer cell proliferation and initiating cancer cell death for cancer patients.

References


Graph 1: Amplification values (Cq) of Myc oncogene

Graph 2: Amplification values (Cq) of Chr17 gene

Graph 3: Relative copy number of Chr17 and Myc compared to Control

Graph 4: Normalized Expression of Myc, relative to Chr17. The Ubc13 knockdown showed a nearly threefold increase in the copy number of Myc oncogene.
Reactions of the Catholic Church in the Wake of the 2016 Presidential Election

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The 2016 Presidential election was particularly divisive for many voters and the beliefs of the Catholic Church did not align with the platform of either of the major party candidates. In this study, I analyze the opinions of Catholic priests across New York City about the election, the candidates and popular issues to establish their relationship with Catholic social teaching. I interviewed twenty-five priests in the summer 2017 about their political activity prior to the election and their thoughts on issues of immigration and climate change. The responses of the priests varied and many of them instead brought up issues of abortion and having large numbers of undocumented immigrants in their congregations. Ultimately this paper asserts that the Catholic Church in New York City does not offer a consistent message to its followers regarding modern political issues and therefore leaves total discretion to the priests and their own political leanings.

The Catholic Church, one of the most powerful institutions in the world, fails to present a consistent message in the arena of American politics. The 2016 presidential election exacerbated its divided messaging, and the church’s internal struggle to find its place in the American political landscape. According to a survey by Jones and Cox (2017), the United States is approximately 20% Catholic and New York State is one of eleven states where Catholicism makes up the greatest percentage of its residents with 31% of the population. Similarly, New York City residents are more likely to be Catholic than in the rest of the country with 34% of residents claiming Catholicism as their religious affiliation (American Values Atlas, 2016).

For this study, five Catholic priests in each of the five boroughs of New York City were interviewed about how they addressed the 2016 presidential election with their congregations. The priests were also asked their opinions on specific issues important to Catholic social teaching that received national attention, such as the proposed wall between the United States and Mexico, the travel ban and the United States pulling out of the Paris Climate Agreement. Despite all the interviewees being Roman Catholic priests who use the same Holy Bible and read the same Gospels each week, the priests’ responses varied based on their own personal political beliefs. Some priests spoke openly about their distaste for President Trump, while others supported him for a variety of reasons. The only similarity between these priests was that they used the same religious doctrine to support their opposing opinions; their similar Catholic beliefs informed their different lines of political thinking. By examining the priests’ answers, this paper explores how the Catholic Church does not have universally accepted teachings when it comes to American politics, and the opinions expressed in church are often based on the priests’ personal political beliefs.

Literature Review
In recent history, there has been no consistent Catholic party. Since 2000, both Republican and Democratic presidential candidates have won most of the Catholic vote but never by an overwhelming majority (Smith & Martínez). The United States Conference of Catholic Bishops does not sponsor a candidate or give direct advice to voters on who they should support but instead releases a document entitled “Forming Consciences for Faithful Citizenship,” which describes their official statements on various issues important to American politics every four years.

As seen in Table 1, Catholic voters have gone back and forth between candidates of the two major parties. Catholics voted for Republican George W. Bush over Democrat and Catholic John Kerry in 2004, but favored Democrat Barack Obama in both 2008 and 2012. In 2016, the Catholic vote swung back to the Republican side with a 52-45 percentage vote of Republican Donald Trump over Democrat Hillary Clinton. (Smith & Martínez, 2016). The difference between parties has not varied more than 9 percentage points since 2000 with Catholics favoring Democrats 3 times and Republicans 2 times since the 2000 election. These numbers underscore the lack of a consistent message in the Catholic Church because the two major parties have very different platforms, and Catholic voters have been swayed differently in each election cycle.

This vacillation between Republican and Democrat demonstrates how the Catholic Church fails to fall into one of the two major political parties, a concept explored further by Gregory Allen Smith in his book Politics in the Parish: The Political Influence of Catholic Priests. In this work, Smith analyzed the political role of Catholic priests who act as representatives of the church. The book focused on his study where he interviewed parish priests and members of their congregation about their political leanings and influences. Smith (2008) acknowledged “the potential for priestly influence is great. Priests have regular access to a receptive and relatively captive audience” (p. 7). Using his own interviews and information coupled with data from the Notre Dame Study of Catholic Parish Life, Smith (2008) documented the potential for priestly influence but also its limitations as his empirical data only supports a level of influence that is largely subtle and indirect. His conclusions solidify the stance of the Catholic Church as an inconsistent one but also leave room for debate regarding the extent to which priests hold influence and if it can be measured empirically.

The most recent “Forming Consciences for Faithful Citizenship” document written by the USCCB was released in 2015 and includes many sections including ones on Migration and Care for Our Common Home. On the topic of migration, the USCCB’s believes:

The Gospel mandate to “welcome the stranger” requires Catholics to care for and stand with newcomers, autho-
CATHOLIC REACTIONS TO THE 2016 PRESIDENTIAL ELECTION

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Table 1. Note. Adapted from Smith & Martínez, (2016, November 09)

rized and unauthorized, including unaccompanied immigrant children, refugees and asylum-seekers, those unnecessarily detained, and victims of human trafficking… The right and responsibility of nations to control their borders and to maintain the rule of law should be recognized but pursued in a just and humane manner. (“Forming Consciences for Faithful Citizenship”, 2015)

The USCCB remains neutral with their statement by referencing a Catholic’s duty to welcome the stranger but also a country’s right to maintain its borders. This statement is hardly controversial and could be used to support immigration rights or to refute them. Not straying away from topics of political interest, the USCCB then moves on to produce a statement on what they call “Care for our Common Home” in regards to climate change:

Our Conference offers a distinctive call to seriously address global climate change, focusing on the virtue of prudence, pursuit of the common good, and the impact on the poor, particularly on vulnerable workers and the poorest nations. The United States should lead in contributing to the sustainable development of poorer nations and promoting greater justice in sharing the burden of environmental blight, neglect, and recovery. (“Forming Consciences for Faithful Citizenship”, 2015)

While the statement on migration could be interpreted in different ways, the Bishops’ statement on climate change is irrevocable. The USCCB not only acknowledges that climate change is an important issue but that the United States is responsible for being a global leader on this front. The “Forming Consciences for Faithful Citizenship” is the closest resemblance of a cohesive Catholic stance on various American political issues. It is distributed nationwide every four years; however, many priests in New York City do not believe its statements to be binding and often disagree with them.

Findings

Political Activity

Each interview began with a series of questions about how frequently and in what contexts the 2016 presidential election was discussed in the months leading up to it. Specifically, priests were asked if they chose to discuss it with their congregations, and if they encouraged their congregations to vote. As with much of the data, it varied greatly depending on the priest and their personal beliefs.

Of the priests interviewed, 48% said they did not discuss the election in the months leading up to it. A common rationale amongst priests who answered this way was that parishioners came to church to hear the word of God and discussing politics merely got in the way of that. The common notion of church not being an appropriate place for political discussions was reason enough for nearly half of the priests interviewed, but the other 52% of priests acknowledged that they discussed the election to some extent in the months leading up to it. Sixteen percent of the priests discussed the presidential election or candidates
CATHOLIC REACTIONS TO THE 2016 PRESIDENTIAL ELECTION

Figure 1

outright, while 36% discussed important issues pertaining to the election but not the candidates themselves. Nearly half of the priests discussed the election to some extent in the months leading up to it while the other half did not think it proper to do so, leaving one to question the inconsistent rationale.

Regardless of the priest’s inclination to discuss political issues leading up to the 2016 presidential election, voting is still a right and privilege the Catholic Church encourages. All but one of the priests interviewed voted in the 2016 presidential election, and 80% of the interviewed priests encouraged their congregations to vote. While the amount of political discourse varied depending on the will of the priest, the clear majority believed voting to be important enough that they encouraged their congregation to do so.

Immigration

One of the most talked about issues of the 2016 presidential election was immigration. Priests were asked about two separate issues relating to immigration: President Trump’s proposed wall between the United States and Mexico and his proposed travel ban prohibiting immigrants from several Muslim majority countries. Like most of the other questions asked, there was no consistent Catholic answer with the response depending on the personal political leanings of the priest. This is problematic for the institution of Catholicism, because it leads to varying but equally accepted religious truths. The lack of a constant answer means that different priests can answer this question according to their own political opinions and still be in harmony with Catholic social teaching.

Regarding the border wall, the question was this: “One of President Trump’s primary promises during his campaign was to build a wall between the United States and Mexico. How do you feel about this rhetoric in relation to the Catholic social teaching?”

Sixty-four percent of the priests responded to this question that they were completely opposed to the idea of a wall between the United States and Mexico, identifying with the part of the Catholic social teaching and the USCCB statement that references welcoming the foreigner. Twelve percent of the priests defend the idea of a border wall, identifying with the part of the Catholic social teaching and the USCCB statement that describes countries having a right to defend their own borders. The other 24% of priests gave a non-answer and seemed to struggle with the conflict between the two pieces of the Catechism and which is more important. Experiences shape political preferences and of the 64% of priests who were profoundly opposed to the building of a border wall, the majority offer a

Spanish mass at their church and therefore have a Hispanic congregation.

Priests also had divided responses to the question regarding the travel ban: “Where do you believe the church should stand with President Trump’s two attempted travel bans, prohibiting immigrants from Muslim-majority countries?” Only 48% of the priests were completely opposed to the travel ban compared to the 64% against the border wall. Twenty-four percent of priests interviewed were in favor of the travel ban while the remaining 28% did not have a conclusive answer to the question. The same two tenets of the Catholic social teaching are present in this question, but there was less outrage expressed over the ban than the wall.

Climate Change

Another issue that has been relevant, particularly after the election of Donald Trump, is climate change. All the priests were posed this question: “On June 1st, President Trump withdrew the United States from the Paris Climate Agreement. The United States Conference of Catholic Bishops called this action “deeply troubling”. Do you agree with their assessment?” The full text of the Bishops’ statement regarding the Paris Climate Agreement is this:

The United States Conference of Catholic Bishops (USCCB), along with Pope Francis and the entire Catholic Church, have consistently upheld the Paris agreement as an important international mechanism to promote environmental stewardship and encourage climate change mitigation. The President’s decision not to honor the U.S. commitment to the Paris agreement is deeply troubling. (2017, June 01)
This question not only addressed the issue of climate change but the USCCB’s standing on it. Sixty-four percent of the priests interviewed agreed with the USCCB that they were deeply troubled by the United States’ withdrawal from the Paris Climate Agreement while 16% agreed with President Trump that pulling out was the correct decision. The other 16% of priests said they did not know enough about the nature of climate change to properly comment or trusted the bishops’ judgment but did not have an individual opinion. 64% is a large majority, but nearly a third of interviewees did not demonstrate unwavering support for the Bishops’ clear statement. Climate Change is an issue that is often split directly down party lines and at least 16% of the priests went with their own political leanings rather than the official statement from the United States Conference of Catholic Bishops. This 16% of priests chose to go directly against the official stance of the USCCB and further demonstrate the rift the Catholic church faces in this increasingly divisive political climate.

Unasked Questions
During these interviews, the same questions were asked and phrased in the same way to each priest. There were certain topics that various priests brought up unprompted, however, and patterns developed regarding what many Catholic priests believe are important enough to their faith and political leanings to bring up in an interview. This study focused on the 2016 Presidential election and the direct consequences of that and therefore priests were not asked questions regarding their feelings about the portions of Catholic social teaching relating to abortion. Despite no questions regarding abortion, 88% of priests brought it up during the interviews. Many brought it up to emphasize how important an issue it is when deciding who to vote for as a Catholic, and others brought it up to say that they dislike how that issue overpowers all others in a lot of Catholic literature and dialogue. Similarly, there were questions about the promised border wall between the United States and Mexico, but never any about the documented status of any congregation. Forty percent of the priests interviewed disclosed on their own prerogative that they have a significant undocumented population in their parish. Both abortion and documentation status are contentious issues but not ones that were specifically asked about in the interviews. Still, to 88% and 40% of priests respectively, they are important enough to broach in an interview about national politics.

Conclusion
The Catholic Church, at least in New York City, is divided. Despite statements by the USCCB, there is often little or no consensus on what Catholics should believe on several important political questions. If political issues are relevant to the church’s teachings, the way in which they are addressed depends on the political opinions of the priest. This study focuses specifically on Catholic priests in New York City, so in order to gain a better understanding of the nationwide Catholic perspective, further interviews would have to be conducted with priests all over the country. Based on the responses of twenty-five Catholic priests throughout the New York metropolitan area regarding political activity, immigration, and climate change, there is not a consistent Catholic opinion. For as much power as the Catholic Church yields, it fails to present consistent interpretations to match the evolving political issues facing the United States. It is because of this inconsistency that the church struggles to find its place in the complex and ever-changing American political landscape.

References

Endnotes
All the interviews were conducted from June-September 2017, before the third version of the travel ban took effect on December 4, 2017.
The Impact of Western Diet Consumption on the Hippocampus

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Extensive animal research points to the role of the hippocampus in the relationship between diet and cognitive health. This review examines the mechanisms by which consumption of a high in saturated fat and refined sugar (referred to as Western Diet, WD) induces hippocampal-dependent cognitive deficits in both humans and animals. WD consumption reduces BDNF expression, blood-brain barrier integrity, and neurogenesis within the hippocampus. Human studies have also linked WD consumption to reduced hippocampal volume as well as hippocampal-dependent learning and memory deficits. The hippocampus also plays a critical role in ingestive control, such that WD consumption may cause hippocampal-dependent deficits in energy intake regulation, subsequently causing increased consumption of the same diet. In children, obesity has been associated with significantly reduced left hippocampal volume and greater hippocampal activation to taste. However, it has yet to be determined whether the impact of WD on hippocampal function is dependent on obesity phenotype.

Introduction

Approximately one-third of children in the United States are overweight or obese (Ogden, Carroll, Kit & Flegal, 2014). Childhood obesity has been linked to obesity in adulthood and poor health outcomes (Biro & Wien, 2010). There has been a global shift towards increased availability and consumption of fast food and sugar-sweetened beverages (Adair & Popkin, 2005), and this trend has contributed to the obesity epidemic which we currently face (Swinburn et. al., 2011). In addition to negative medical outcomes, consumption of a diet high in fat and refined sugar (often referred to as Western diet, WD) has been associated with the development of mental disorders such as depression and dementia (Jacka, Sacks, Berk & Allender, 2014), and there is evidence that healthy diet is inversely related to the risk of cognitive decline (Lai et. al., 2013; Psaltopoulou et. al., 2013). This suggests a putative impact of diet on the brain. While many brain structures and functions may be impacted by an unhealthy diet, extensive animal research points to the role of the hippocampus in the relationship between diet and cognitive health.

The hippocampus is located within the medial temporal lobe and plays a critical role in processes such as learning and memory (Squire, 1992). The blood-brain barrier in the hippocampal formation may be susceptible to damage associated with Western diet exposure due to its high nutrient demands and cellular plasticity. The hippocampus is particularly vulnerable to environmental insults as it is one of the few areas in the brain where neurogenesis continues into adulthood. For example, there is a significant association between childhood socioeconomic status and hippocampal volumes in late adulthood (Staff et. al., 2012). In particular, low SES may limit a child’s access to healthy foods, leading to unhealthy diet consumption and thus affecting the hippocampus. This finding is consistent with the assertion that early life conditions and experiences affect brain development, particularly in the hippocampus. There has been no association found between childhood socioeconomic status and whole brain volume, which indicates that the effect is not global and does not affect all brain regions equally. The effects of child socioeconomic status were mediated by several factors including poor diet, low-quality parental care, an impoverished and understimulating environment, and prenatal exposure to toxic substances (Staff et. al., 2012). Furthermore, early stress attenuates development of the hippocampus (Teicher et. al., 2003), perhaps through decreased dendritic branching and reduction in the number of neurons (Schreiber et. al., 2003). Thus, hippocampal functioning is particularly susceptible to environmental insults, including consumption of an unhealthy diet.

Animal Studies

The long-term intake of a WD produces cognitive deficits in animals, especially in hippocampal-dependent tasks. Hippocampal-dependent tasks such as the Morris Water Maze and Radial Arm Maze are procedures used in rodents to study spatial learning and memory, which rely on the hippocampus. Impairment on such tasks has been observed following the consumption of diets high in fat (Morrison 2010), saturated fat (Granholm, 2008), sucrose (Cao, Lu, Lewis, & Li, 2007) and both saturated fat and refined sugar (Molteni, 2002). Similarly, consumption of a WD produces deficits in performing non-spatial hippocampal-dependent tasks, such as Novel Object Recognition (Jurdak 2009) and a negative-feature discrimination problem (Davidson et al., 2012). Animals fed a WD did not show impairments in tasks that do not depend on the hippocampus, such as a simple discrimination task (Davidson et al., 2012). These results demonstrate that consumption of a high-fat and sucrose diet produces a selective impairment in hippocampal function as opposed to a more global cognitive disruption.

These hippocampal-related cognitive deficits following WD consumption have been linked to changes in gene expression in the hippocampus. In one study, mice fed a high-fat diet over 23 weeks exhibited impairments in hippocampus-dependent spatial memory as well as reduced expression of hippocampal SIRT1, a gene associated with memory consolidation (Heyward et al., 2012). Perhaps most significant is the link between WD consumption and the expression of Brain Derived Neurotropic Factor (BDNF). Consumption of a WD has been shown to reduce levels of BDNF, leading to impairments in neuronal plasticity, learning and behavior. BDNF affects neuronal plasticity through molecules such as synapsin 1 and cAMP response element-binding protein (CREB), which are associated with synaptic function underlying learning and memory (Wu, Ying, & Gomez-Pinilla, 2004). One study in rats found that two months on the WD were sufficient to reduce hippocampal levels of...
BDNF as well as performance on a spatial learning task (Molteni et al., 2002). Thus, it is thought that the effects of Western diet consumption on the hippocampus are at least partially mediated by the effects on BDNF.

Diet-induced oxidative stress may interact with the BDNF system, further contributing to cognitive dysfunction. In order to determine whether oxidative stress (which can be reduced through exercise) plays a role in the effects of WD, rats were given access to a running wheel following the consumption of a high-energy diet (Molteni et al., 2004). Diet-induced decreases in BDNF, synapsin 1, GAP-43, CREB and spatial cognition were reversed in rats allowed voluntary running wheel access during the 2-month diet period. Additionally, rats with access to the running wheel were found to have lower levels of oxidative stress. Thus, oxidative stress following the consumption of a high-energy diet may play a role in BDNF reduction and impairments in hippocampal-dependent cognitive functions.

Another possible mechanism by which WD consumption impacts hippocampal function is by altering the integrity of the blood-brain barrier (BBB). The blood brain barrier appears to be particularly vulnerable to disruption by dietary factors. One longitudinal study in humans found that a higher body mass index (BMI) in midlife was associated with impaired blood brain barrier integrity 24 years later (Gustafson et al., 2007). Western diet consumption may lead to damage of the BBB, including reduction in expression of proteins that make up the BBB and increase in BBB permeability. In rats, maintenance on a diet high in fat and cholesterol for 6 months resulted in increased BBB permeability and reduced expression of the tight junction protein occludin (Freeman & Granholm, 2012). Some rat studies have linked HFS induced changes to BBB integrity with hippocampal function. In one study, 90-day consumption of a HFS diet was shown to decrease the expression of tight junction proteins Claudin-5 and Claudin-12, as well as impair performance on a hippocampal-dependent negative discrimination task (Kanoski et al., 2010). In another study, damage to the blood-brain barrier and changes in mRNA expression were detected after only 10 days on a western diet (Hargrave et al., 2015).

Studies also suggest that the impact of Western diet on the BBB and hippocampal function may differ depending on whether obesity is induced. For example, the use of hippocampal-dependent “place” or hippocampal-independent “response” strategies in a maze was assessed following WD exposure in diet-induced obese (DIO) rats, in diet resistant (DR) rats who were relatively insensitive to the obesogenic properties of WD, and in chow-fed controls (Hargrave et al., 2016). The place strategy, which involves learning about the location of a rewarded goal box in relation to other objects in space, has been shown to depend on the hippocampus, whereas the response strategy involves learning what motor response leads to the rewarded goal box and is hippocampal-independent. The diet-resistant rats as well as the chow-fed controls favored the place strategy, whereas diet-induced obese (DIO) rats were more likely to use the response strategy. In addition, blood-brain barrier leakage was observed in the hippocampus of DIO, but not DR or chow-fed rats. Increased ventral BBB permeability was associated with reduced use of hippocampal-dependent place strategy. In a similar study, performance on both hippocampal-dependent serial feature-negative (FN) and hippocampal-independent simple discrimination problems were assessed in rats who consumed a high-energy (HE) diet as compared with rats in the control group (Group Chow) who were fed a standard chow diet (Davidson et al., 2012). For rats fed the high energy diet, those that weighed the least and had the lowest amount of body fat (HE-diet resistant rats) performed similarly to Group Chow on both discrimination problems. HE diet-induced obese rats (who weighed the most and had the most body fat following HE diet consumption) performed like Group Chow on the hippocampal-independent simple discrimination problem, but exhibited impaired performance on the hippocampal-dependent FN problem. Furthermore, blood-brain barrier permeability was assessed and it was found that concentrations of an exogenously administered dye was elevated in the hippocampus for HE diet-induced obese rats relative to the HE diet-resistant and Chow groups. These results further demonstrate that the negative effects of a high-energy diet on the hippocampal-dependent cognitive functions are associated with increased permeability of the blood-brain barrier and that both of these effects vary with sensitivity to HE diet-induced increases in weight and adiposity.

In addition to reduction in BDNF expression and an increase in blood-brain barrier permeability, other physical changes in the hippocampus have been observed following WD consumption, including altered blood vessel structure (Freeman et al., 2011) and altered dendritic morphology (Granholm et al., 2008). One study found that hippocampal Map-2 staining was reduced in rats fed a saturated fat diet, indicating a loss of dendritic integrity (Granholm et al., 2008). In addition, Map-2 reduction was correlated with memory errors. Another study found that consumption of a diet high in trans fats or cholesterol also resulted in Map-2 reduction (Freeman et al., 2011).

### Hippocampal Neurogenesis

Western-style diet may also have a direct impact on hippocampal neurogenesis, which is known to continue throughout the lifespan. Prolonged consumption of high fructose solution has been shown to reduce hippocampal neurogenesis in rats (Van et al., 2011). This reduction in hippocampal neurogenesis was accompanied by increased apoptosis in the hippocampus, suggesting that chronic consumption of fructose is detrimental to the survival of newborn hippocampal neurons. Consumption of a diet high in fat has also been shown to reduce hippocampal neurogenesis in male, but not in female rats (Lindqvist et al., 2006). The male rats did not exhibit increased weight compared with control rats, indicating that the reduction in hippocampal neurogenesis was independent of fat tissue accumulation, but was instead the result of the actual ingestion of dietary fat. These findings conflict with the previously mentioned study in which the impact of WD on the hippocampus were found to differ depending on whether obesity was induced.

Whereas the consumption of WD is associated with a decrease in hippocampal neurogenesis, reduction in calorie intake has been shown to increase adult hippocampal neurogenesis in rodents. This effect is at least partially mediated by BDNF. The dentate gyrus of the hippocampus contains neural precursor cells which may divide and differentiate into neurons and glia (Gage, 2000). One study found that maintenance of adult rats on a dietary restriction regimen results in a significant increase in the numbers of newly produced neurons in the dentate gyrus of the hippocampus (Lee et al., 2002). Furthermore, the expression of BDNF was increased in hippocampal cells of rats maintained on a restricted diet (Lee et al., 2002).

In a second study to determine the role of BDNF in hippocampal neurogenesis following dietary restriction, heterozygous knockout (BDNF +/-) mice and wild-type mice were
WESTERN DIET AND THE HIPPOCAMPUS

maintained on a dietary restriction or ad libitum diet for three months (Lee et al., 2002). The BDNF knockout mice were genetically modified to have one inactivated or “knockout” copy of the BDNF gene, and thus are considered heterozygous for the BDNF gene. BDNF levels in the hippocampus were reduced in knockout mice maintained on an ad libitum diet, and were increased by dietary restriction in wild-type mice and to a lesser extent in BDNF +/- mice. Dietary restriction had no effect on the proliferation of neural stem cells, but significantly improved the survival of newly generated neurons. Thus, proliferation in the dentate gyrus was not modified, but the rate of the survival of the new neurons was increased. The reduced neurogenesis in BDNF knockout mice was associated with reduced volume of the dentate gyrus. Overall, these results suggest that BDNF plays a critical role in regulation of neurogenesis in the dentate gyrus of adult mice, and that BDNF contributes to the enhancement of neurogenesis following dietary restriction by promoting the survival of newly generated neurons (Lee et al., 2002). In summary, evidence from animal studies supports the role of WD in hippocampal-related cognitive deficits, which are mediated by increased BBB permeability, reduced BDNF expression, and reduced neurogenesis in the hippocampus.

Human Studies

Human studies, though fewer in number, have also demonstrated the impact of Western diet consumption on hippocampal functions. Greater consumption of a diet high in saturated fat and sugar is associated with impairments in hippocampal-dependent learning and memory (Attuquayefio et al., 2017). The effect on HDLM differs depending on the type of fat that is consumed. One study, which specifically looked at consumption of saturated fat and omega-3 fatty acids in children, found that saturated fat intake was negatively associated with hippocampal-dependent relational memory, whereas omega-3 fatty acid intake was positively associated with this type of memory (Baym et al., 2014).

WD consumption has also been linked to smaller hippocampal size in adults. One longitudinal investigation of adults aged 60-64 years found that higher consumption of a “Western” dietary pattern was associated with smaller left hippocampal volume (Jacka et al., 2015). Participants completed a food frequency questionnaire and underwent two magnetic resonance imaging scans approximately four years apart. Poor quality diet and aging were both independently associated with smaller left hippocampal volumes (Jacka et al., 2015). No correlation was observed between dietary patterns and right hippocampal volume. The results of this study indicate that the left hippocampus may be more prone to diet-induced neurodegeneration.

Role of the Hippocampus in Food Intake Regulation

In addition to being involved in learning and memory, the hippocampus also plays a critical role in ingestive control, including the ability to perceive internal states such as hunger and satiety (i.e., interoception) (Davidson et al., 2010). Animal studies have shown that damage or inactivation of the hippocampus impairs processing of interoceptive signals and increases food-seeking behaviors and food intake. Rats with hippocampal lesions exhibit impaired discriminative responding as compared with controls, and this impairment is based largely in elevated responding to nonreinforced food deprivation cues (Davidson et al., 2010). Moreover, the hippocampus is associated with eating behaviors and body weight regulation in humans. Patients with hippocampal damage demonstrate a decreased ability to suppress food intake following meal consumption, suggesting that the hippocampus may be involved in utilizing satiety signals to inhibit eating behavior (Henderson, Smith & Parent, 2013).

Davidson et al. (2005) propose that this creates a ‘vicious cycle’ of food intake and cognitive decline in which an unhealthy diet interferes with the ability of the hippocampus to inhibit activation of the memories of food and the rewarding consequences of eating. The disruption of this inhibition causes these memories and environmental cues that evoke them to have increased ability to trigger appetitive responses that are required for obtaining and consuming food. Weakening of this control of energy intake leads to excess intake of food, leading to further hippocampal deficits. Thus, HFS diet consumption triggers neurological changes in the hippocampus, affecting cognitive functions that are involved in energy intake regulation and subsequently causing increased consumption of the same diet (Davidson et al., 2005).

Consistent with this, obesity is associated with reductions in gray matter in the hippocampus (Bauer et al., 2015), which has been associated with deficits in memory as well as other hippocampal-dependent functions. In children, obesity has been associated with significantly reduced left hippocampal volume and greater hippocampal activation to taste. In one study, twenty-five 8-12-year-old children completed a magnetic resonance imaging scan while participating in a taste paradigm (Mestre et al., 2005). Children with obesity, compared to healthy weight children, showed reduced left hippocampal volume and greater hippocampal activation to taste. Furthermore, activation in the hippocampus was associated with eating in the absence of hunger (Mestre et al., 2005). The results of this study are consistent with the vicious cycle model of obesity and cognitive decline. However, it is uncertain whether the changes in hippocampal structure seen in this study precede or are a result of children becoming obese from a sustained Western Diet.

Discussion

Due to the complex nature of the relationship between Western Diet, obesity and the hippocampus, it is difficult to determine whether the cognitive effects on the hippocampus are a result of an unhealthy diet itself or are instead the result of obesity. While Western diet consumption has been associated with reduced hippocampal size in older adults, this relationship has yet to be explored in children. In addition, animal models have found conflicting evidence as to whether the impact of WD on hippocampal function is dependent on obesity phenotype. It is important to better understand the impact of a WD in children because in order to effectively prevent diet-induced hippocampal deficits, we must determine the cause—whether it is obesity, or the consumption of an unhealthy diet itself that is most detrimental to the hippocampus. Future studies could examine whether there are differences in hippocampal volume between healthy weight and obese children who both regularly consume a WD.

Limiting the amount of saturated fat and sugar in one’s diet is a non-invasive and theoretically easy method of preventing hippocampal deficits. However, access to healthy foods may be limited due to several factors, including SES. Children in low SES families may be disproportionately affected by diet-induced hippocampal deficits for this reason. One way to combat this issue is by providing education and other resources to low SES families about the impact of diet on physical and cognitive health, especially in children. This could be taken a step further.
by demonstrating how to achieve a healthy, balanced diet on a low budget. These initiatives have the potential to reduce the incidence of diet-induced hippocampal deficits in a large percentage of at-risk children.

References


The Perceptions of Microfinance Services by Female Artisans in the Markets of Chinchero and Pisac, Peru

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This study examines the perceptions of microfinance models by female artisans in the Sacred Valley of Peru. Interviews with artisans in and near the central markets of Pisac and Chinchero reveal the motivations for borrowing from certain financial institutions. It is determined that artisans in rural communities are more likely to favor group lending because of the perceived difficulty of securing loans from a bank and the lower transactions costs offered by non-profit microfinance institutions. Self-employed artisans and vendors are more likely to prefer independent loans because of their dislike of obligatory savings accounts and responsibility to other borrowers. In addition to psychological and cultural barriers to obtaining a loan for many artisans, there is a large mistrust of formal banking services for lending and saving purposes. As a result, there is a trend to organize amongst friends, family and co-workers to create alternative means of lending.

Introduction

Microfinance has been a controversial financial model in the field of development economics since the creation of the modern industry by organizations like The Grameen Bank in the 1970s. Microfinance can be explained as a tool for small business owners and individuals who require a small amount of capital to invest in order become more efficient in their trade. Specifically in Peru, there are a variety of groups that interact as a result of microfinance. Artisans, agriculture workers, and other small business owners rely on the network of international investors, banks, and microfinance institutions (MFIs) that offer services in both rural and urban settings. Lack of infrastructure, distance to urban centers, and poor financial education cause difficulties for many indigenous artisans and agriculture workers in obtaining microloans. While microfinance can be a tool for many, the number of different models and institutions has made it difficult to track the impact and efficiency of microfinance across the world. This exploratory investigation studies the perception of microfinance services in artisan markets in The Sacred Valley of the Incas. By doing so, possibilities emerge for future investigation that can more holistically help microfinance players in better determining how indigenous artisan clients select a source of microloans and how accessibility to services can be improved.

Literature Review

There is little current academic research offering insight on artisan microfinance clients. However, existing literature does discuss both the general impacts of microfinance in Peru and the developing world. Because of the large diversity of microfinance models in the world, it is difficult to track the overall impact through individual case studies. However, many researchers discuss the need to find solutions that can maximize the positive impacts of microfinance while addressing common concerns associated with the field. Economist and academic Susanna Khavul analyzes some of the more negative aspects of the industry, which can include clients falling into a cycle of debt and the challenging logistics of saving money (Khavul, 2010). Another major problem with microfinance today is the inability to effectively measure the impact of microcredits in the lives of clients. Khavul argues for a measurement that is based not on the repayment rate of loans, but rather “evaluating the success of microfinance initiatives by measuring business investment and household consumption consequences rather than repayment rates” (Khavul 2010). However, much of the literature also discusses the need to base the success of a microloan on the capacity and business knowledge of the client (Conroy, 2000).

Concerning the state of the microfinance industry specifically in Peru, anthropologist Nicole Coffey Kellett found that microcredits in extremely rural areas “can undermine the financial security of borrowers, increase economic inequality, and decrease food security” (Kellett, 2011). Furthermore, it is agreed that the microfinance sector in Peru is focused in urban centers due to the accessibility of services, concentration of people and developed transportation infrastructure. Kellett explains that workers in informal sectors like agriculture and artisanry have lower salaries in contrast to the workers in urban centers like Lima: “Much of the growth in the formal sector is focused on urban coastal regions as opposed to rural highland provinces... only 27 percent of the population in the highland department of Apurímac is waged workers, compared to 60 percent in Lima” (Kellet 2011). Scholars Carmelo Intrisano and Anna Paola Micheli discuss Peruvian investment in microfinance and demonstrate the concentration of microcredits in urban areas. They find that Lima has the greatest demand for microloans--more than half of all the microcredits in the country (Intrisano & Micheli, 2015). It is clear from the literature that despite gains in the microfinance industry in Peru, the system can be improved in order to better serve the communities in development, especially through governmental policies that promote higher quality of transportation infrastructure to make microfinance services more accessible to rural populations.

Methods

This study was conducted over the course of 12 days in the communities of Chinchero and Pisac and incorporates a total of 25 interviews. Artisans are colloquially defined as workers in a skilled trade. In the case of Peruvian markets, artisans work with a variety of products, including the wool of alpaca, gold, leather and woven textiles. For this study, there is no
Subjects self-identified as artisans, meaning that in some cases they could be considered vendors who buy and sell goods. This paper uses information gathered from interviews with artisans in rural communities and urban markets as well as employees from the companies Arariwa and Mibanco.

Chinchero and Pisac were selected as the setting for this study due to their location in the most important tourism corridor in Peru and their relatively close distance to Cusco (45 minutes by road). Many tourists pass through these towns during their stay in Cusco and journey to the archaeological site of Machu Picchu. Both towns have a central market and large indigenous artisan population. Due to their proximity to the urban centers of Cusco and Urubamba, both towns have access to a variety of microfinance institutions-- NGOs, municipal banks and small financial cooperatives (referred to as cajas). The principal economic activities in both of these regions are agriculture and tourism, due to the long tradition of artisan textiles and nearby archaeological sites.

Microloans are administered by a variety of institutions. MFIs are typically non-profit organizations, though some have become commercial enterprises. Development offices (ED-PYMES in Peru) are owned and operated by non-governmental organizations (NGOs), with most of the funds from multilateral development agencies and, to a lesser extent, private charitable organizations and host governments (Stefan 2005). This study examines artisan clients from traditional banks and MFIs as well as an organization called Arariwa. Arariwa is a non-governmental organization based in Cusco that models its services on the group lending structure pioneered by Grameen Bank. This model uses the idea of joint liability to incentivize payment of a loan. Called bancos comunales, these groups are comprised of mostly female, low-income clients. The goal of the organization is to offer microfinance services like credits and savings accounts to populations in more rural areas of Peru. In the region of Chinchero, there are 28 bancos comunales and the majority are comprised of agricultural workers. Usually there are 10-16 members in a group and the loan can be between 50 and 20,000 soles which is approximately between $15 and $6,200 U.S. dollars. Every month the clients gather to meet their Arariwa representative and pay their quotas on the loan. In addition to the credit, every client is required to have a savings account as the organization believes that access to savings is a fundamental part of microfinance.

In this study, the interviews were semi-structured and had a mix of open-ended questions and more specific questions about the uses of individual loans. Interviews were conducted in Spanish as the majority of artisans encountered were bilingual in Spanish and Quechua. Basic questions were asked of the artisans in order to obtain a baseline through which to compare perceptions and uses of microfinance services.

The population of study focused on indigenous Quechua women who defined themselves as artisans. More specifically, the artisans were broken into four groups of women: 1. artisans who had never had nor currently have a microloan 2. artisans who currently have a loan from Arariwa 3. artisans who currently have a loan from a formal banking institution and 4. artisans who currently or in the past have had a loan from both Arariwa and a different formal banking institution. Effort was made to select an equal number of women in all categories in both communities. Interviews of the people who did not have a loan and the people who had loans solely from a bank or caja were conducted in the central market in both Pisac and Chinchero. The regional office of Arariwa in Urubamba was consulted to locate the artisans with loans from the organization that were based near Pisac and Chinchero. Direct contact with the artisans was made independent of the organization.

Participants were aware of the premise of the study and the researcher’s role as a student. In all cases, effort was made to adhere to the ethical standards of the IRB and all study participation was voluntary and the responses were kept anonymous and confidential unless explicit verbal permission was given to use responses and names. It was also made clear that responses would not have any effect on the relationship between the study participant and their partnership with a microfinance institution.

<table>
<thead>
<tr>
<th>Pisac (including Huandar and Chahuaytire)</th>
<th>Chinchero</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artisans that do not have a loan</td>
<td>3</td>
</tr>
<tr>
<td>Artisans that only have an individual loan from a bank or MFI</td>
<td>2</td>
</tr>
<tr>
<td>Artisans that have a loan from Arariwa</td>
<td>3</td>
</tr>
<tr>
<td>Artisans that have a loan from Arariwa in addition to a bank or other MFI</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
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Table 1: Categorization of Artisan Interview Subjects in Pisac and Chinchero

Limitations
There were a few limitations encountered in the duration of the study. First, it was the intention of the investigator to only interview women for the study. However, two men were included in Chahuaytire because they were the only artisans in the lending group that could speak Spanish and not solely Quechua. This language limitation also inhibited the participants chosen for the study in the central market in Chinchero and in the community of Huandar. The inability to include the perceptions and opinions of the solely Quechua speaking clients causes a gap in the study sample because these women could provide valuable information on how microfinance institutions can better serve indigenous clients.

Results
Artisans without a loan from a microfinance institution
From the eight interviews collected with artisans that do not use microfinance services, it was determined that the artisans and vendors require capital for the operation of their businesses, but the mistrust of formal banks and negative perception of microcredits cause them to seek other solutions to their financial needs. Many people expressed the desire for more capital in interviews. Virginia, a vendor in the central market in Pisac said that “Si no tienes mercadería, qué vendes? Sin capital, no hay nada, no se puede vender nada. Para una artesana, el acceso al dinero es una necesidad” [If you do not have merchandise, what do you sell? Without capital, there is nothing, you cannot sell anything.]
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For an artisan, access to money is a necessity [Virginia, Pisac]. Additionally, half of the artisans in this group explained that they were not concerned about financial investment in their market stalls because of their ability to diversify their income with agricultural activities. Many have chakras or small farming operations to supplement their artisanal work. They spoke about the need to sell guinea pigs, wheat, potatoes and other goods during the low season of tourism because of the decline in income, while others said they only sell artisan goods during the weekend when they can afford to be away from their land.

It seems that opportunities to gain working capital through microfinance services would be welcomed by this group; however, all of the artisans interviewed in this category discussed the perceived complications surrounding the process of taking out a loan from a bank or caja. There is a fear of interest rates and the ability to repay monthly quotas. Artisans said, “el proceso es muy complicado” [The process is very complicated] (Artisan, Chinchero) or “parece muy difícil para pagar, especialmente con interés” [They appear difficult to pay, especially with interest.] (Yirena, Pisac). Other barriers to taking out a loan include the requirement of a guarantee and personal identification. A woman in the Center of Traditional Textiles (CCTC) in Chinchero says that the majority of the artisans in the center do not have a microloan because they are scared of interest and because they need papers that may be hard to obtain. Additionally, it is important to note that the majority of the artisans without a loan also do not have a savings account—another indication of the mistrust of banks in the region and avoidance of microfinance services.

The mistrust of financial organizations and the need for capital has caused artisans to form their own version of lending groups. For example, the artisan from CCTC says that her co-workers in the center put some of their money together in a communal fund to loan to each other. They use the money to buy materials to make their crafts and others use the loans to pay for their children’s education. Most importantly, there is no interest and there is none of the perceived difficulty of going to a bank or caja and signing for a loan. Similarly, in the central market of Pisac there is a game called “Pandero” that can be seen as a tool to easily loan to familiar members of the community. Every month, the artisans put forth an amount of money into a communal pot. They then draw numbers to determine the order in which they get to take out the “loan”. Virginia says that the amount of money is not substantial, but it allows vendors to purchase additional merchandise for the market stalls. The process works because “somos responsables entre todos, hay mucha confianza” [we are responsible between us, there is a lot of trust] between the vendors and partners in the market. Finally, Jesusa is a convenience store owner but she receives a group loan from Arariwa with other artisans. She is unique because she has loans from Arariwa and from a bank in Cusco in addition to a loan that she receives from a group of friends. She says that her loan from the bank has high interest and the group loan with Arariwa does not function well because she doesn’t know everyone in the group personally and “algunos pagan y algunos no, cuando una falta de pagar, otros necesitan cobrar” [some pay and others do not, when someone misses a payment, others need to cover them] (Jesusa, Chinchero). She likes the loan with her group of friends because “somos responsables y es una rotación entre amigo, no hay problemas” [we are responsible and it is a rotation between friends, there are not problems] in addition to there not being interest on the loan. Domitila, a vendor in the central market in Pisac described this idea well when she said “nosotros aquí no trabajamos con un banco, hay mucho interés. Si necesita capital, se presta de amigos, no hay interés y hay solo amistad y más confianza” [we do not work with banks here, there is a lot of interest. If you need capital, you borrow from friends, there is no interest and there is only friendship and trust] (Domitila, Pisac). The concept of this kind of borrowing between friends and family has been studied previously. In their article on microfinance trends in Peru, Martín Valdivia and Jonathan Bauchet show that the majority of loans in rural homes in 2000 were not from sources of “MFIs, regulated or unregulated, but other informal sources such as the local store, local traders, and relatives” (Bauchet & Valdivia, 2003). Additionally, independent loaning groups and activities like “Pandero” are examples of the concept of social capital that artisans utilize to confront their mistrust with banks (Fernández, 2012).

Finally, despite the negative perception of formal loans, many artisans are open to utilizing them in the future—especially if they have a clear idea for the use of a loan. An artisan in Chinchero says that she does not have the need at the moment to secure a loan but would like to get one in the future to go to school and study education. Additionally, in both Pisac and Chinchero, competition in the markets is fierce for all artisans. There are many problems with a “mafia de guías” [mafia of guides] (Chacha, Pisac), referring to the tourism guides that partner with certain vendors for a commission. Furthermore, variety of merchandise is almost nonexistent in the central markets. Chacha, a metalworker in Pisac, explains this: “para mí, la competencia es poco porque mis trabajos son un poco diferentes, para otros, venden lo mismo... ellos necesitan bajar sus precios mucho...la competencia es más que antes” [For me, the competition is little because my work is a little different. For others who sell the same thing... they need to lower their prices a lot... the competition is more than it was before] (Chacha, Pisac). She argues that she is one of the last producers in the market and the rest are vendors who buy their goods from manufacturers from Cusco or Puno to the south. Because of this she must sell her goods at a price higher than most tourists are willing to pay in the markets. Chacha would like to secure a loan in order to diversify her stall and sell some goods at a lower cost.

Perceptions about Technical Credits of Group Loans from Arariwa

Artisans that partner with Arariwa enjoy lower transaction costs securing loans from a bank. Downsides, however, include the lack of cohesion of bancos comunales and lack of punctuality with payments. The mix of opinions about group lending demonstrates the individuality of the loaning process and the importance of factors like previous credit experience, location, type of business and relationship to the other members in a group.

Artisans with the most positive view of bancos comunales work side-by-side with members of their group in artisan centers or cooperatives. They view a loan from Arariwa as an opportunity to support their colleagues and avoid the difficulties of securing a loan from a bank. For example, artisans in the community of Chahuaytire have worked together in the same center for more than 20 years. The members say that the most important aspect of their loan with Arariwa is the monthly quota collection service. For Félix, who also has a loan from a caja in Cusco and is required to travel to the city to pay every month, this service is a huge benefit. Félix says that a loan from Arariwa is “mucho mejor de los préstamos individuales. Trabajamos juntos en el centro, es más tranquila con un grupo...es muy costo-
so y toma mucho tiempo para viajar a Cusco.” [It is much better than individual loans. We work together in the center; it is very calm in the group...it is very expensive and takes a lot of time to travel to Cusco]. For the client, the transaction costs must be factored into the decision of where to obtain a loan. Many low-income clients are excluded because they do not have sufficient resources to pay all of the costs associated with securing a loan— which can include transportation, opportunity cost of lost time and proper documentation (Ladman 17).

In addition to the lower transaction costs of working with Arariwa, there is a greater sense of support within the bancos comunales that work in artisan centers. Awana Llaqta, a center in Chinchero has a group of 10 people with loans from Arariwa. Celia has worked with the organization for eight years. She says that during her time with the organization there are always people in her group that cannot pay their quota, but, “nos ayudamos a pagar, todos ayudan a las personas” [we help them pay, all help the people] (Celia, Chinchero). Ofelia, another artisan in the group, said that she has thought about securing an individual loan, but “es muy difícil para tener un préstamo de un banco porque se necesita un título de una casa, necesita papeles, es un proceso muy lento” [It is very difficult to have a loan from a bank because you need a title of your house, papers, it is a slow process] (Ofelia, Chinchero). She is going to continue borrowing with Arariwa because “se puede sacar rápido, trae plata, no necesitas viajar” [you can take out money quickly, they bring money, you don’t need to travel.] and “es un beneficio ahorrar nuestro dinero.” [it is a benefit to save our money]. To put this in perspective, of the six artisans that only have a loan from Arariwa, five of them have a positive perception of the organization. However, of the four artisans that have both kinds of credit, three have a negative perception of the organization and will not continue working with Arariwa.

There is another group of artisans and vendors that have a negative perception of the loans from Arariwa. Roxana and Jesusa, members of the same banco comunual, say that it is impossible to work with their group. Always there are people who do not pay or are late in their payments. Because of these problems, Roxana says that “es mejor trabajar individual que en grupos...siempre hay problemas con un grupo cuando las personas no pagan” [it is better to work individually than in groups...always there are problems with a group when the people do not pay] (Roxana, Chinchero). She will not continue working with Arariwa because “no hay ninguna ventaja, si tiene un negocio propio, pienso que es mejor trabajar con un préstamo individual.” [there is no advantage, if you have your own business, I think it is better to work with an individual loan]. Additionally, she claims that her work in the store does not give her the ability to save due to the quick exchange of cash: “cuando yo tengo un negocio, no puedo ahorrar mucho, necesito dinero rápido para comprar y vender.” [when I have a business, I cannot save much, I need money quickly in order to buy and sell.] A lack of education about saving accounts has led to her perception that she does not have the capacity to save and thus cannot take advantage of Arariwa’s savings services.

The group of artisans in Huandar, a small community outside of Pisac, also suffer from the lack of cohesion and late payments in their banco comunual. Roxana, a client of Arariwa for four years, says that “me perjudican cuando trabajo con un grupo, cuando una persona no pagar, todo el grupo está afectando” [they harm me when I work with a group, when a person does not pay, all of the group is affected] (Roxana, Huandar). Magdaline, from the same group, also says that in the past the group was...
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izations can use this trust to expand their reach. Additionally, there are realistic fears and barriers to securing a loan. Organizations need to make the process clearer and demonstrate its ease to potential clients. Certain techniques to attract more clients in urban settings, like billboards and television announcements, are not going to be as effective in rural communities. In the case of this study, many artisans found alternative means of borrowing (forming groups of friends or colleagues, borrowing from family) without interest rates. The groups and games like “Pandero” make it clear that organizations need to find a way to be more attractive to these potential clients. Demonstrating their concrete benefits (for example, training for small business owners, financial education, saving accounts and lower interest rates) need to be attractive enough to the client to combat the mistrust of financial institutions.

Finally, this study alludes to a need for more technical training and financial education for clients in rural settings, especially in regard to how clients can effectively save money and manage a loan. The majority of artisans that were not required to hold a savings account with Arariwa did not have an independent savings account with any institution. This is a result of the mistrust of banks and cajas to protect savings without incurring major costs or loss in savings. Three artisans spoke at length about how the majority of people in these regions prefer to hide their savings in their homes rather than entrusting it to banks. Without training and financial education, they cannot understand the potential benefits to formal savings services and learn how to avoid future financial disasters.

Conclusion

Regardless of the varied perception of microloans, the overall consensus by artisans interviewed that have had or currently have loans is that they are useful and important in their lives. 12 out of 14 people with loans have positive things to say about their loans and the assistance. The artisans said things like, “[un préstamo] es una ventaja para un negocio” [a loan is a big advantage for a business] (Roxana, Arariwa Chinchero) or “un préstamo, siempre es importante, es una ayuda, puedo usar para cualquier cosa, si no hay plata no hay nada” (Félix, Chahuaytire) [a loan, always important, it is a help, I can use it for anything. If there is no money, there is nothing.] Roxana used a loan to construct a guesthouse. Her home, called “La Casa de la Tejedora” (House of the Weaver), is another way for her to sell her textiles and products to the tourists that come and stay with her. She says that “sin préstamo, no puedo hacer nada...si no tuviera este dinero no haría nada...para mi es muy importante, con esta facilidad puedo comprar cosas que para mi vida y mi casa, tengo movilidad. [Un préstamo] fue importante, fue útil para mí.” [Without a loan, I cannot do anything...if you do not have money you will not have anything. For me it is important, with this ease I can buy things for my life and my house, I have mobility. A loan was important, was useful, for me.]

The findings reported here will open up possibilities for further research in the field. One of these topics is the exploration of the idea of empowerment with female artisan microfinance clients. It is possible that different types of financial models have varied impacts on the empowerment and decision-making abilities of female microfinance clients. Another important possibility for future research is comparing how the perceptions of this study correspond to the financial well-being of the artisans by investigating how microloans impact their annual income or quality of life. Additionally, in many rural Andean communities, the concept of ayni is used to describe the collective responsibility community members have to one another and the reciprocal nature of actions. There is potential for the study of this concept and how such a worldview has an impact on the loan repayment system in the banco comun model.

References


Notes

2. Translations by the author.
History is the composite of individual stories which, when combined, describe a people, a culture, and a way of life. John Demos, the author of *The Unredeemed Captive*, prefaces his novel by stating, “most of all, I wanted to write a story.” Using primary sources and extensive analysis, Demos tells the tale of a prominent Puritan family from Deerfield, Massachusetts in the eighteenth century. This family experienced anguish and loss while dealing with the reality of colonists during the time of Queen Anne’s War and beyond. The constant pull between civilization and savagery exposes the fears dwelling with a society of apprehensive people looking for their saving grace. John Demos, in his book *The Unredeemed Captive*, combines the arts of historical research and analysis with the beauty of storytelling. As a result, Demos creates a new methodology of exposing the history of an entire people existing in a region and epoch belonging nowhere else than as a storybook.

The story begins on Monday, February 28, 1704. The blackness of night has blanketed the town of Deerfield. All was quiet until footsteps began to crunch over the white snow. The invaders, dressed in war paint, broke into homes, scalped children, women, and men alike, grabbed prisoners, and set fire in their wake. The snow, painted crimson with blood, left evidence of the brutal attack. Reverend John Williams, a prominent figure within colonial America, was one of one-hundred-and-twelve captured, including his wife and five remaining children following the scalping of his two other children. The Native Americans were allies with the French and brought their captives up to French Canada. Williams’ wife was killed shortly into the trek because she was too weak to keep up. Miraculously, the rest of the family survived, although separated amongst their captors. Within a few years, John Williams and four of his children were able to return home after their release was negotiated between the French and English government. However, Eunice, the second youngest, remained with her Mohawk captors who Williams’ noted “would as soon part with their hearts as my child.” Over the next couple of years, acculturation took place and Eunice was no longer willing to return from her new “savage” lifestyle. She married a Native American, François Xavier Arosen, and converted to Catholicism. John Williams died with his heart empty from the company of his daughter’s love and presence. Stephan, Eunice’s brother, attempted to regain his lost sister, but met the same disappointment. Eunice had children with her husband and lived her life as part of the Kahnawake people until her death in 1785.

Through Eunice’s story, Demos exposed the history of colonial Massachusetts including relations with the Native American allies of French Canada. Demos argues that the animosity directed towards Native Americans by the Puritans and other colonists came from a fear of the unknown. In fact, in the opening of the book, Demos addresses the Massachusetts Bay Colony and how it was to be a vessel in which “from the ‘darkness of heathenism’ they will be drawn toward the bright light of Protestant Christianity.” Darkness became a strong association with the Native Americans. Like a child afraid of the dark, communities feared the darkness of the wild – feared the unknown. In the light of God, they hid from “the nightmare prospect: civilized people willingly turned savage, their vaunted ‘Old World’ culture overwhelmed by the wildernes.” The thought of darkness consuming their soul made them turn to vile hatred and disgust towards the people whose mystery kept the fear manifested deep within the fabric of their communities. Demos even portrayed the colonists’ view of Native American’s as wolves and winter as the “Night of wolves.” In other words, Native American’s and the land they called home were new and full of mystery. Consequently, colonists feared them. By Eunice being absorbed into their culture and way of darkness, her family faced the ultimate nightmare.

Early on, Eunice refused to speak to those attempting to influence her return to Massachusetts. In one of John Williams’ letters he noted how she was “obstinately resolved to live and dye here, and will not so much as give me one pleasant look.” One of William’s correspondents, Schuler had even “rated Eunice below the worst of Indians” for her betrayal. However, Eunice’s story isn’t just her own; it is the story of many captive people who chose to take on the lifestyle of the wolves their blood relatives feared. In actuality, “Eunice is one of several – in fact, dozens – won over to alien ways, and unable any longer to speak English, and bound by new ties of marriage and family.” All of those individuals, like Eunice, experienced “ambiguity of their cultural, and geographical, placement – and the extraordinary complexity of their history.” Eunice herself had connections to English-colonial life, Kahnawake traditions, and Catholic piety. These connections are portrayed by the names she possessed. She was Eunice to her English blood-ties; she was A’ongote to her Kahnawake community, she was baptized as Marguerite to the Catholic Church, and gained the second name of Gannenstenhawi meaning “she brings in corn” to the Kahnawake people. Eunice’s multiple identities is a representation of the undeniable ties between competing cultures in the New World. More importantly, her later correspondences with her brother Stephen show the ability for different cultures to communicate and coexist. The fear of darkness can be extinguished as soon as the colonists have the bravery to stop label-

Demos delivers facts, but persistently attempts to interpret and dissect those facts in order to present a rich saga. The result is a holistic tale of a brave girl who would normally be lost to history.
John Demos is a revolutionary historical writer because he combines historical integrity with artistic presence and power. Demos is able to craft a narrative voice for a figure in history, Eunice, who had little more than one document to share her story. Not letting the lack of sources limit his ability to tell her tale, he employs a degree of speculation to fill in the gaps. Demos delivers facts, but persistently attempts to interpret and dissect those facts in order to present a rich saga. The result is a holistic tale of a brave girl who would normally be lost to history. However, the significance of this text does not end with Eunice. Demos crafts an internal monologue that portrays not only Eunice’s inner-consciousness, but the psyche of all “unredeemed” captives. Moreover, the narrative gives a voice to an entire category of people previously ignored by history.

Although *The Unredeemed Captive* should be praised for its novel methodology in historical writing, Demos ends the novel with a misleadingly uplifting aura on the relationship between Native Americans and white settlers. He leaves the reader believing that the “mingling of blood” between the two cultures was leading to a cultural convergence that was amounting to peace and mutual understanding. That is a false reality. Conflict, biases, and racism were still deeply engrained in the relationship between the two cultures. Demos was attempting to show how Eunice and her lineage represent the ability of some individuals to adopt the lifestyle and beliefs of a multitude of perspectives. However, Demos should have made it clearer that Eunice’s story, and the story of other unredeemed captives, is unique. Their ability to cross cultural boundaries is not representative of a mass merging of cultural realities. Reframing this

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ending to speak only to unredeemed captives and not all colonists would restore the historical accuracy of Demos’ speculative narrative.

John Demos challenges traditional historical writing by combining factual historical analysis with narrative storytelling. In *The American Historical Review*, he wrote that his aim of writing *The Unredeemed Captive* was to convey a singular family story while touching on the generic themes of “love and hope, separation and loss, grief and understanding.” In doing so, he dared to bring the claims of human nature to the territory of historical writing. He gave Eunice the opportunity to have her story told through analytical speculation and artistic storytelling. Simultaneously, by using Eunice as a vehicle, Demos unveiled the fear of an entire people, their desire of safety and security, and the slow process of individual healing and acceptance. It is easy to say that his narrative is one for the storybooks.

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