Information needs of people who use drugs

- There is very little research that has been conducted into the health information-seeking behaviors of people who inject drugs.
- Most of the work in this area is from the perspective of the researcher, not the person who injects drugs.
- Only two such articles were found in the domain of information science, and six, total, between all academic domains.

This scoping review will be a thorough examination of the literature that studies the concept of the health information behavior of people who inject drugs. The goal is to increase my knowledge to position myself to begin conducting human subjects research in this area so that I can improve health information services to this disadvantaged population.

Search Terms

PRISMA to Create Full Text Sample

Records identified through database searching n = 106

Records with duplicates removed n = 87

Records screened n = 87

Records excluded after title/abstract review n = 67

More search terms added

Additional non-duplicate records screened n = 326

Full-text articles excluded for eligibility n = 41

Studies included in the final dataset n = 6

Records excluded after title/abstract review n = 301

Summary

In the first iteration of searching, I used traditional terms for PWIDs. Getting no information science articles back, I expanded my search terms to the more additional public health terms. I also added health literacy which combines information seeking and discernment.

By doing so, I greatly expanded my recall, but not my precision—evidenced by the number of articles assessed for full-text inclusion.

It appears that the health information behaviors and needs of this population, from their perspective, and not as reported first by researchers, is largely unresearched.

This project is now the basis for a study on the health information needs expressed by users of the social media site Reddit on the subreddit, r/opiates. It is my hope that an anonymous internet forum that gets @3,000 posts a month will provide more clarity on this population’s health information needs.

Databases consulted

- Academic Search Complete
- CINAHL Plus with Full Text
- Com & Mass Media Complete
- Library Lit & Info Sci Full Text
- Library, Info Sci & Tech Abstracts
- Readers’ Guide Full Text Mega
- MEDLINE/PubMed
- SCOPUS
- APA PsycInfo
- Social Services Abstracts
- PAIS International
- Web of Science
- Project Muse

Information needs found in this study:

- Overdose prevention
- Interest in obtaining Narcan and Naloxone
- Desire to avoid fentanyl
- Receipt of general health information without stigma
- Risk engagement in drug/sexual activity
- Infectious disease prevention

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A Mechanism for Axonal Length Sensing

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Introduction

Axons are long protrusions that emanate from the cell body of a neuron. They conduct electrical impulses to communicate with other neurons, glands, and muscles. Their lengths vary widely within a given organism -- in a human they range from a micron to a meter in length! With such large cell-to-cell variability, it is unclear what the underlying mechanism is for a neuron to sense and control its axonal length.

Recently, a group of experimentalists hypothesized a bidirectional motor transport mechanism for axonal length sensing that would form the front end of a length control mechanism: molecular motors transport a chemical signal from the cell body to the tip of the axon which activates the transport of a second chemical signal back to the cell body. The returning chemical signal represses the production of the first chemical signal via negative feedback, resulting in oscillatory dynamics whose frequency decreases with axon length. If axonal growth rates are correlated with this frequency, then information regarding the length of the axon can be communicated to the cell body. Axonal growth may then be regulated via frequency-dependent activation of gene transcription factors. For this project we will develop a multi-scale model of motor dynamics and chemical signals to show how oscillations emerge and how they are linked to motor dynamics. We also determine how robust the oscillations are to variation in parameters. This research is a first step to uncover mechanisms underlying neurodegenerative diseases such as Alzheimer’s or Parkinson’s.

Chemical Signal Dynamics

We model chemical signal dynamics with a system of 4 delay differential equations. Let $E_0$, $I_0$, and $E_1$, $I_1$ be the concentrations of the excitatory and inhibitory signals at the cell body and axon tip, respectively. Here the delays $\tau_1$ and $\tau_2$ represent the time required for motors to traverse the axon. The quantities $L_1$ and $L_2$ describe the flow of motors carrying chemical signals. The system also describes production, degradation, excitation, and inhibition of chemical signals. We find that the dynamics pulse when the delays cross a critical value, and that the delay is linked to microscopic motor dynamics. Our model thus makes explicit the crucial role delayed negative feedback plays in encoding spatial information.

Model for Motor Dynamics

We model motor dynamics with an exclusion process on a lattice. Consider a motor hopping along a track traversing the whole axon. The track is represented as a lattice of $N$ sites with spacing $l/N$, where $L$ is axon length. A motor hops to the right at some rate $h$ if the adjacent site is vacant. A motor enters the lattice at the first site of the track at a rate $\alpha$ if the site is vacant and may exit the lattice at the last site of the track at a rate $\beta$. The flow and density of motors is sensitive to parameters $\alpha$ and $\beta$. This means that the dynamics of cargo transported by motors to traverse the axon are strongly correlated with Parameters that dictate motor transport. Our model is the first to make this link explicit. Let $\rho$ be motor density in the axon. Then, we have:

$$\tau = \frac{L}{h(1-\rho)}, \quad J = h\rho(1-\rho)$$

Robustness of Mechanism

The mechanism is robust. As axon length grows, the parameter values at which oscillations begin remain largely unchanged. This is important since we do not desire a mechanism that is sensitive to parameter values. A cell is a noisy, fluctuating place. Circumstances will change, but the mechanism should not!

Takeaways and Future Directions

- We developed a model that links microscopic properties (motor dynamics) to macroscopic properties (chemical signal dynamics).
- The model makes explicit the crucial role delayed feedback plays in generating oscillations and provides a mathematical foundation for a plausible axon length sensing mechanism.
- The model is robust to parameters; thus, it encodes spatial information reliably.
- We next ask: how does the axon decode information? We will feed the chemical signal into a gene network and investigate how protein production can be used to sense spatial information.

References
Introduction

• Stormwater best management practices (BMPs) are effective watershed management strategies to control nutrients, restore watersheds and achieve water quality goals

• Lack of understanding on the effectiveness of the BMPs in nutrient control

• Improvements in the understanding of how BMPs affect nutrients in urban areas will help planners and decision makers to select the optimal management strategies for achieving watershed restoration goals.

Objectives

• development of a framework to 1) evaluate existing nutrient reduction plans to determine if they effectively decrease nutrient loading and 2) identify the optimal configuration and combination of BMPs to control excess nutrients in the watershed

Summary of Findings

• BMPs including wet detention ponds, baffle boxes, alum treatment, improved wastewater treatment systems, and restoration of natural were the most effective strategies to control excess nutrients.

• A total of 48 locations for potential siting of structural BMPs were identified and only 11 of the 48 identified sites are recommended as potential structural BMPs locations based on the established criteria in this study.

Broader Impacts

• Assist water resources managers and decision makers in better management of nutrients and subsequently algae blooms through implementation of BMPs, thereby addressing the challenges in the coastal ecosystem.

• The results will not only benefit Tampa, but also can be broadly applicable to other urban watersheds across the state of Florida.

Future Research

• Generate the necessary data to strength our proposed future investigations on BMP effectiveness.

• Advance the ability to identify the most resilient and cost-effectiveness BMPs to mitigate the impacts of flooding and nutrients in shallow groundwater environments.

• Evaluate the role of nature-based solutions (e.g., BMPs) for mitigating short- and long-term implications of sea level rise in coastal regions.
The Prophetess Unveiled: Religious Authority and Ambiguous Gender in the Art of the Medieval Bible

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Background
In the eleventh-century Roda Bible, a manuscript produced at the monastery of Santa Maria de Ripoll in Catalonia (Spain), monks illustrated the Book of Judges with an image of Deborah, a prophetess and judge of the Hebrew Bible who had the additional distinction of acting as a military leader (Judges 4–5; Fig. 1). Deborah appears on a mountainside, where she stands above the figure of Barak and urges him to lead an army of Israelite tribes against the Canaanite forces. Barak agrees on the condition that Deborah accompany him: “If thou wilt come with me, I will go: if thou wilt not come with me, I will not go” (Judges 4:8).

Deborah’s portrayal reveals the monks’ reception of such an individual: in contrast to the surrounding men, she wears the long robes associated with patriarchs, prophets, and others with privileged access to God; yet unlike other women in the Roda Bible, her head is unveiled to reveal shortly cropped hair.

Summary of Findings
The short-haired Deborah in the Roda Bible is among the earliest surviving portrayals of the prophetess, and an unexpected depiction of a woman’s masculinity to signal full domination of body and spirit—one of the great aspirations among monastic communities of the Middle Ages.

Evidence and Conclusions
Biblical interpreters traditionally read Judges 4 and 5 as narratives designed to unsettle expectations of men’s and women’s behaviors. In foregrounding an unexpectedly authoritative woman and a military leader’s failed masculinity, the story reinforces the binary of masculine and feminine. Arguably, this interpretation applies to later representations of Deborah in manuscripts intended for courtly rather than monastic audiences. In a thirteenth-century example, she is an incongruous figure within the warfare scene (Fig. 2).

Without martial or marital roles in society, the cloistered readers of the Roda Bible would have been far less concerned with maintaining their power and virility than with attaining their religious ideals. The Roda Bible’s Judges illustration does not draw attention to gender differences, instead aligning Deborah’s appearance with that of young men and angelic beings in the same manuscript.

In the context of other illustrations produced at Ripoll, as well as theological texts on brave women’s ability to “overcome” or “transgress” their sex, the gender-nonconforming Deborah from Santa Maria de Ripoll emerges as a model for ideal monastic behavior rather than a prescriptive image about the differences between men and women.

Future Research
In her recent piece on “Medieval Masculinities without Men,” Karma Lochrie calls for the expansion of medieval masculinity studies to include masculine women. While there has been preliminary work on masculine women in medieval literature and saints’ lives, the present research represents a new direction in the underdeveloped field of masculine women in the art of the Middle Ages. Future directions for the project will include the study of angelic beings in medieval text and image. These sources might similarly reflect ideas about ambiguous gender expression as a sign of admirable character or proximity to the divine.

RESEARCH QUESTION

How does community policing affect police officer attitudes?

BACKGROUND

Conventional Wisdom
• Community policing affects CITIZEN attitudes, trust, and crime reporting

What's missing
• In policing, trust is a two-way street
• Poor policing also results from OFFICER ignorance, mistrust and fear
• To date, almost no evidence on how community policing affects officers

HYPOTHESES

Participation in community policing will increase officer:
• Knowledge about citizen needs
• Trust in citizen motivations
• Empathy towards citizen concerns
• Accountability for interactions with citizens

COMMUNITY POLICING EXPERIMENT

Context: 8-month community policing program in Sorsogon Province in the Philippines (pop 850,000)

Working with the Philippine National Police, we randomly assigned which officers participated in the province-wide community policing program.

RESULTS

☑ Community policing increased officer knowledge
☒ But it did NOT improve trust, empathy, accountability

WHAT EXPLAINS THE RESULT?

1) Officer “Embeddedness”
Positive effects among officers from different provinces, but no effect among “local” officers with formed opinions

2) Officer Safety Concerns
Officers who conducted community policing in areas with high crime or insurgent presence saw worse attitudes.

CONCLUSION

• Simple assumptions about the effect of community policing on officers do not pan out.
• Instead, the effects are highly contingent on 1) WHO the participating officers are and 2) the safety context of WHERE they are assigned.
Towards eliminating rural digital inequality: A study of rural electric cooperatives (RECs) as broadband service providers

The phenomena of interest

• 35% of people residing in rural communities in the US lack access to broadband internet service
• Few large telecommunications companies are interested in serving rural areas due to low ROI
• Nationally, more than 150 out of 900+ rural electric cooperatives (RECs) have started to offer fiber broadband internet service, but they face varying internal and external challenges to successfully building infrastructure and offering service

Initial findings

• Strategy drivers: Community socioeconomic development needs, grid modernization, mission relevance, imitation
• Characteristics influencing strategy: Access to funding, cooperative governance, regulatory environment, conservative approach to risk
• Organizational learning: Discrepancy in institutional logics of for-profit telecom service and not-for-profit electric service (e.g., differing norms for technical support and customer service)

Exploratory study objectives

• Develop a grounded understanding of REC leaders’ strategic decisions to build infrastructure and offer broadband service
• Generate hypotheses about the internal and external characteristics that enable and constrain RECs’ broadband strategy

Method

• Comparative case study design, incorporating interviews with REC senior leadership, document review (annual reports, tax returns, media coverage), and visualizing geospatial data
• Study scoped to 3 Southeastern states where RECs operate broadband service (AL, GA, MS)

Next steps

• Follow-up interviews with REC senior leadership
• Expand participation to additional RECs, conduct site visits
• NSF grant proposal development

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Exploration of the atmospheric boundary layer near urban areas in observations and high-resolution models

More than half of the world’s population resides within cities, creating very dense populations compared to rural regions; by 2050, more than two out of every three inhabitants will live in a city\(^1\). Consequently, the vulnerability of urban residents is amplified during impact weather and climate events. The ability of forecasters to accurately predict weather is primarily dependent upon land-based observation networks and numerical weather models. Current generation high-resolution models are limited by computationally expensive physics and modeling components and, consequently, omit urbanization schemes. Forecasters must utilize complementary information to provide accurate forecasts to end-users including the commercial sector and general public\(^2\). Urban climate literature has consistently documented the impact of cities on the immediate environment\(^3\). Many of these studies focus on individual cities and are limited to near-surface atmospheric manifestations of land cover and land use change\(^4\). Research focusing on the lowest kilometer of the atmosphere above building height, or the urban boundary layer (UBL), is limited but this area may influence weather events and their predictability in high-impact scenarios. This project aims to address this deficiency in published research.

**What is the atmospheric boundary layer?**

The reflection of urbanization is not only present at the surface but extends beyond the tree and building canopy into the planetary boundary layer, the portion of the atmosphere subject to vertical mixing due to heating of the Earth’s surface\(^5\). The height of the boundary layer increases during the daylight hours as incoming solar radiation actively warms the surface causing air to rise and fall turbulently. The boundary layer ceiling decreases at night as surface-based buoyancy diminishes. The boundary layer is bounded at its maximum height where the influence of mixing due to surface heating and friction go to zero. The layer above this level is the free atmosphere.

**Operational weather models initialize with greater error near urban areas during high impact weather events.**

United States forecasting agencies do not currently incorporate urban-scale parameterizations into their numerical prediction modeling suites. Despite this technical shortcoming, forecasters are tasked with using complementary evidence to provide accurate forecasts during high-impact events. Since urban climate research shows that cities can impact weather from local to regional scales, determining the utility of current observation networks and high-resolution models across weather scenarios becomes important in meeting information demands of the public and commercial entities. This project adds to the existing body of research by analyzing modeling capability near densely populated urban environments in the continental United States.

**Data**

**Modeling output.** The National Oceanic and Atmospheric Administration’s (NOAA) National Weather Service (NWS) has historically implemented three generations of higher resolution models in their daily scheduled operational suite – the Rapid Update Cycle, the Rapid Refresh, and the High-Resolution Rapid Refresh. Archived model output data will be filtered by location and selected dates. **Weather events.** The NOAA National Centers for Environmental Information archives weather station data from multiple current and historical sites across the nation. The data contain variables such as temperature, wind speed and direction, dewpoint, precipitation type and amount, and heat indices. **Boundary layer observations.** Twice daily, NOAA NWS offices simultaneously release weather balloons to measure upper air properties such as temperature, moisture, and wind speed.


**References**


Introduction

- Cells sense and respond to mechanical forces and the stiffness of their environment using specialized mechanosensitive proteins.
- Many of these mechanosensors reside at the cell surface and undergo force sensitive conformational changes that drive cellular signaling [1, 2].
- Recent evidence has also indicated that cytoskeletal connections to the nuclear envelope through nesprin are also involved in the transmission and sensing of mechanical forces and activation of YAP [3-5].
- This work aims to implement fluorescence resonance energy transfer (FRET) based tension sensors to measure molecular forces on proteins of the nuclear envelope and determine their dependence on cytoskeletal contractility and substrate stiffness.

Methods

FRET Based Nesprin Tension Sensor: The tension sensor module is inserted between the calponin homology domain (CH, actin binding) and the KASH domain (nuclear envelope binding) of nesprin 2 mini [6]. As the module is stretched under force the two fluorescent proteins separate leading to a decrease in FRET. A control sensor that lacks the actin binding CH domain was also used. Ratiometric FRET was calculated from shade and bleed corrected images.

Perturbations to Force:

Cells were seeded on fibronectin coated glass with or without 50μM blebbistatin to inhibit myosin. For low stiffness experiments, cells were seeded on FN coated 2kPa PDMS.

Nesprin 3 Tension Sensor:

An additional tension sensor using the same tension sensor module inserted into a different nesprin (nesprin 3, Fig. 1B) that does not contain a CH domain, but contains an evolutionarily conserved domain that interacts with intermediate filaments.

Figure 1: Schematic of cytoskeletal force transfer

Results

Figure 2: (A) FRET tension sensors can be used to measure molecular forces. Increase in force stretches the elastic linker and reduces FRET. (B) Schematic of the Nesprin 2 sensors used here and the Nesprin 3 sensors currently being made.

Figure 3: Nesprin 2 is subjected to myosin dependent tension. Tension sensor measurements for cells spread on fibronectin coated glass with or without the myosin inhibitor blebbistatin (Bleb, 50μM) (A) representative images of nesprin 2 sensors and heatmaps of FRET with (B) cell-wise quantification of nesprin 2 FRET (n=11-16 cells/grp) Mean +/- SEM. ** p<0.01, One-way ANOVA with Tukey’s post hoc. Scale = 10μm.

Figure 4: Substrate stiffness alters Nesprin 2 Tension. (A) representative images of nesprin 2 sensor and heatmaps of FRET for cells on glass (stiff) and 2kPa PDMS (soft) with (B) cell-wise quantification of nesprin 2 FRET (n=13-16 cells/grp) Mean +/- SEM. ** p<0.01

Discussion

- Nesprin 2 tension sensor data indicates a significant amount of force acting on nesprin 2 in spread cells.
- Force on nesprin 2 was lost with inhibition of myosin using blebbistatin (Fig. 3), consistent with previous work using the MLCK (ML7) and ROCK (Y27632) inhibitors of contractility [6].
- Cells on low stiffness displayed less flattened and spread nuclei (Fig. 4), similar to myosin inhibition.
- Low stiffness reduced the force on nesprin 2, indicating an important role for nesprin 2 in the previously described nuclear deformation regulated stiffness sensing [5].
- Future work will focus on force transfer to other components of the LINC complex that do not have an actin binding domain, and to other non CH domains of nesprin 1 and 2 (Fig. 2).

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References

(Re)considering Participatory Cultures for and with Practicing Teachers

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Participatory Culture as Framework

“A participatory culture is a culture with relatively low barriers to artistic expression and civic engagement, strong support for creating and sharing one’s creations, and some type of informal membership whereby what is known by the most experienced is passed along to novices. A participatory culture is also one in which members believe their contributions matter, and feel some degree of social connection with one another” (Jenkins et al., 2006, p. 3).

“Educators must work together to ensure that all...have access to the skills and experiences needed to become full participants, can articulate their understanding of how media shapes perceptions, and are socialized into the emerging ethical standards that should shape their practices as media makers and participants in online communities” (Jenkins et al., 2006, pp. 3-4).

English Education Course “Participatory Culture in Literacy and Learning” as Context

- Online teacher education master’s-level course
- Asynchronous environment/format
- 8 pre- and in-service literacy educators across content areas

Collaborative Inquiries into Our Practices as Educators across Contexts and Roles

- How do we as educators engage in and with participatory cultures? How do our students?
- How can we facilitate participatory cultures in our own classrooms? What are the challenges and affordances?
- What is the role and/or impact of asynchronous contexts and forms of engagement in fostering participatory cultures and on learning?

Participatory Research Methodologies

- Course instructor (Plummer Catena) and graduate student/practicing teacher (Valencia-Rhymen) as co-researchers
- Collaborative analysis of course documents and shared multimodal projects from “Participatory Culture in Literacy and Learning” course
  - Content analysis (Neusendorf, 2016; Saldaña, 2015)
  - In vivo coding (Miles, Huberman, & Saldaña, 2014)
  - Teachers’ own words serve as codes

Implications for Teacher Educators and Practicing Teachers

- Facilitating participatory cultures in classrooms necessitates and opens opportunities for “authentic” engagement
- Educators can work to understand what “authentic” is and involves in their contexts by “zooming in” or reflecting in and on practice across contexts
- What does “access”—both to technology and to critical engagement in/with it—look like in our teaching and learning contexts?
- What forms of professional development do we engage in both in and out of classrooms (our own and others)?
- Asynchronous learning contexts and tools offer flexible structures and choices that can support facilitating for and engaging in classroom participatory cultures

Future Directions for Participatory Work

- More collaborative forms of practitioner inquiry (Cochran-Smith & Lytle, 2009)
- Professional development that centers “collaborative design” (Voogt et al., 2015) with teachers as “participatory designers” (Cober, et al., 2015)

“opportunities for peer-to-peer learning, a changed attitude toward intellectual property, the diversification of cultural expression, the development of skills valued in the modern workplace, and a more empowered conception of citizenship” (Jenkins et al., 2006, p. 3)

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