



Creating rich representations of scholarly articles to support learning and review



Phil Gooch

scholarcy

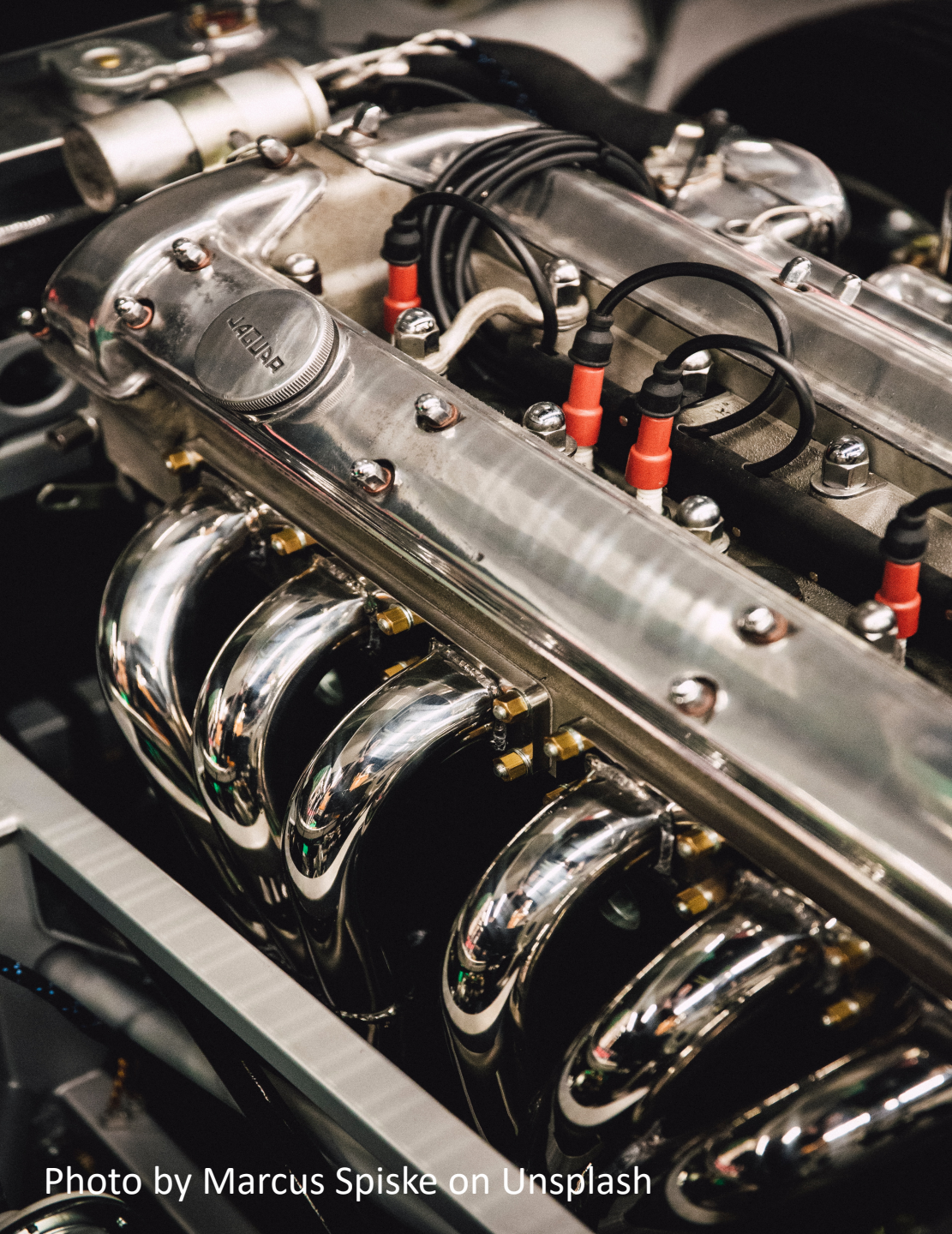


Photo by Marcus Spiske on Unsplash

Overview

Goals and groundwork

Building the Scholarcy engine

From documents to machine-readable data

Approaches to summarisation

scholarcy



Photo by N. on Unsplash

Beyond discovery

- What do I need to know to help me understand this article?
- What were the main findings?
- What are the limitations?
- Can I trust this, and how can I check?

Not always in the abstract!

Or there is no abstract (book chapters)

Enabling improved understanding

Introduction

Methods

Results

Discussion

- Our results confirm the association between GBA variants and increased risk for IRBD, and suggest that severe and mild GBA variants have differential effects on risk, similar to previous reports in PD.[5] Furthermore, isolated rapid-eye-movement (REM)-sleep behavior disorder variants may have earlier AAO, and may convert faster to overt neurodegenerative disease. However, the results on AAO and conversion should be considered as preliminary only and with caution, due to several limitations, age at onset low.

• Three previous small sample size studies have examined the association between GBA variants and IRBD.[15-17] Two of these studies included full sequencing of the gene,[15, 17] and the third only examined two specific variants (p.N370S and p.L444P).[16] Due to their size, analyses of specific variants. 15. Gamez-Valero A, Iranzo A, Serradell M, et al. Glucocerebrosidase variants and the risk of developing a clinically-defined Lewy body condition. European Journal of Neurology. 2018;31(12):2183-2191. doi:10.1002/euro.23811. PMID: 30111111. European Journal of Neurology. 2018;31(12):2183-2191. doi:10.1002/euro.23811. PMID: 30111111. European Journal of Neurology. 2018;31(12):2183-2191. doi:10.1002/euro.23811. PMID: 30111111.



- The risk for developing a clinically-defined Lewy body condition was similar in patients with idiopathic REM sleep behavior disorder with and without glucocerebrosidase gene variants
- Investigated whether GBA variants are overrepresented in IRBD and if their presence shortens the time to conversion to clinically-defined LBD
- All GBA coding exons from 69 polysomnography-confirmed IRBD patients and 84 matched controls were sequenced by the Sanger method
- The risk of developing a LBD was similar in IRBD subjects with GBA variants than in those without variants
- In IRBD, GBA variants are 1) more frequent when compared to controls, 2) associated with impending PD and DLB but 3) not indicative of a short-term risk for LBD after IRBD diagnosis

Conclusion

Funding

Participants

Data and code


Ethics

References




- Background knowledge expansion
- Adding links
- Highlighting important points
- Fact-checking against cited sources

Enabling improved discovery

From title and author in search results ...



[Advanced Search](#)

14,528 results for **alzheimers tau** Sort By: **Relevance**  **SEARCH ALERT**  

Filters: [Clear all filters](#)

Subject Area

- Biology and life sciences (14,094)
- Medicine and health sciences (12,162)
- Research and analysis methods (9,835)
- Biochemistry (7,766)
- Cell biology (6,446)

[Usp14 Deficiency Increases Tau Phosphorylation without Altering Tau Degradation or Causing Tau-Dependent Deficits](#)
Youngnam N. Jin, Ping-Chung Chen, Jennifer A. Watson, Brandon J. Walters, Scott E. Phillips, Karen Green, Robert Schmidt, Julie A. Wilson, Gail V. Johnson, Erik D. Roberson, Lynn E. Dobrunz, Scott M. Wilson
Views: 4742 • Citations: 17 • Saves: 28 • Shares: 0

[Reverse Engineering a Signaling Network Using Alternative Inputs](#)
Hiromasa Tanaka, Tau-Mu Yi
Views: 3112 • Citations: 0 • Saves: 21 • Shares: 0

[Increased Tau Phosphorylation and Tau Truncation, and Decreased Synaptophysin Levels in Mutant BR1₂/Tau Transgenic Mice](#)
Holly J. Garringer, Jill Murrell, Neeraja Sammeta, Anita Gnezda, Bernardino Ghetti, Ruben Vidal
Views: 5290 • Citations: 14 • Saves: 25 • Shares: 0

Enabling improved discovery

alzhimers tau Advanced Search

14,528 results for **alzhimers tau** Sort By: **Relevance** SEARCH ALERT 🔔 📡

Filters: Clear all filters

Subject Area

- Biology and life sciences (14,094)
- Medicine and health sciences (12,162)
- Research and analysis methods (9,835)
- Biochemistry (7,766)
- Cell biology (6,446)

[show more](#)

Article Type

- Research Article (14,447)
- Correction (78)
- Review (2)
- Formal Comment (1)

Usp14 Deficiency Increases Tau Phosphorylation without Altering Tau Degradation or Causing Tau-Dependent Deficits
Youngnam N. Jin, Ping-Chung Chen, Jennifer A. Watson, Brandon J. Walters, Scott E. Phillips, Karen Green, Robert Schmidt, Julie A. Wilson, Gail V. Johnson, Erik D. Roberson, Lynn E. Dobrunz, Scott M. Wilson

- Investigated if loss of Usp14 results in decreased levels of endogenous tau and ataxin-3 in the nervous system of mice
- Found increased levels of phosphorylated tau that correlated with the onset of axonal varicosities in the Usp14-deficient mice

Views: 4742 • Citations: 17 • Saves: 28 • Shares: 0

Reverse Engineering a Signaling Network Using Alternative Inputs
Hiromasa Tanaka, Tau-Mu Yi

- Presents a strategy termed Alternative Inputs to perform systematic epistasis analysis
- Introduced the concept of an "AIs-Deletions matrix" that summarizes the outputs of all combinations of alternative inputs and deletions
- Proposes that systematic epistasis analysis and the data collected in an AIs-Deletions matrix can complement current functional genomics approaches

Views: 3112 • Citations: 0 • Saves: 21 • Shares: 0

Increased Tau Phosphorylation and Tau Truncation, and Decreased Synaptophysin Levels in Mutant BR1₂/Tau Transgenic Mice
Holly J. Garringer, Jill Murrell, Neeraja Sammeta, Anita Gnezda, Bernardino Ghetti, Ruben Vidal

- Tg-FDD-Tau mice exhibited an age-dependent accumulation of both ADan and tau
- Shows that expression of human mutant BR12 enhances tau phosphorylation and C-terminal cleavage of neuronal tau, while ADan deposition remained comparable to its parental strain

Views: 5290 • Citations: 14 • Saves: 25 • Shares: 0

... to title, author,
and main findings
in search results
(‘micro-abstract’)



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Building the Scholarcy engine

Python

- spacy.io
- snorkel.org
- [textacy](https://textacy.com)
- [gensim](https://gensim.org)
- [flask](https://flask.palletsprojects.com)

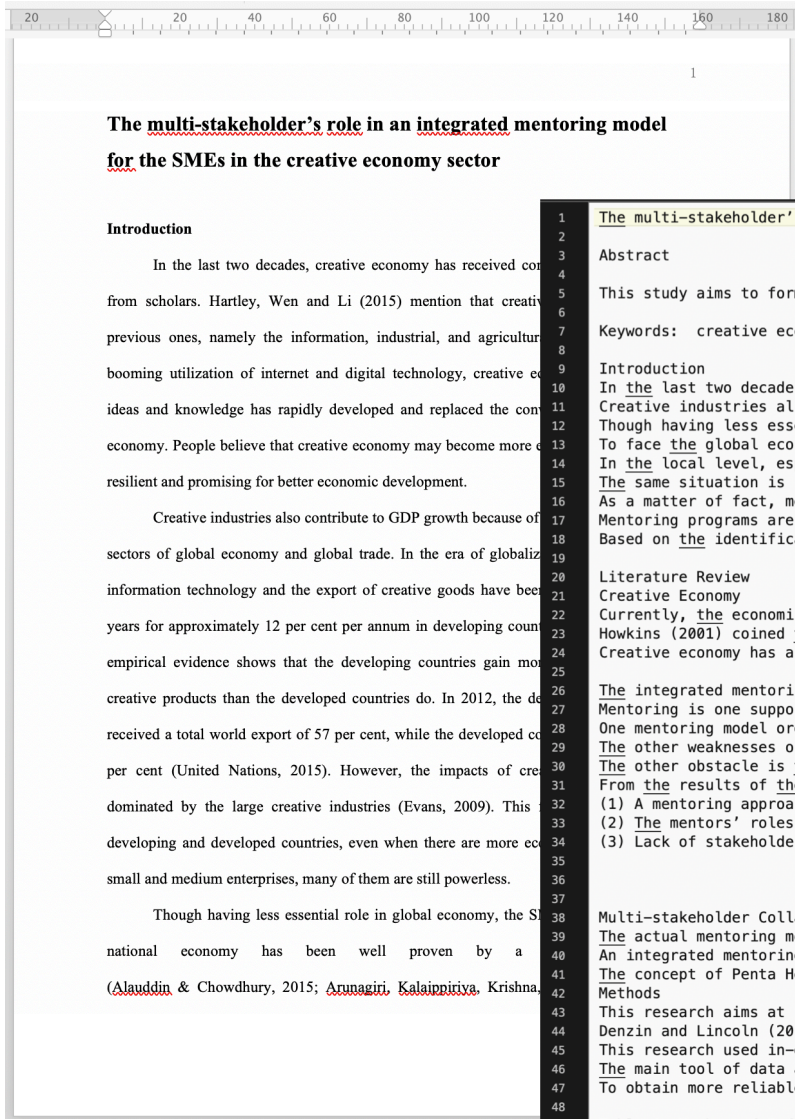
Ruby

- [anystyle-parser](https://github.com/Shopify/anystyle-parser)

C++

- [pdftotext](https://github.com/Shopify/pdfimages), [pdfimages](https://github.com/Shopify/pdfimages), [pdffigures](https://github.com/Shopify/pdfimages)

From documents to machine-readable data



```
1 The multi-stakeholder's role in an integrated mentoring model for the SMEs
2
3 Abstract
4 This study aims to formulate an integrated mentoring model by involving mul
5
6 Keywords: creative economy, small and medium enterprises, integrated mento
7
8 Introduction
9 In the last two decades, creative economy has received considerably high at
10 Creative industries also contribute to GDP growth because of its most rapid
11 Though having less essential role in global economy, the SMEs' contribution
12 To face the global economic competitions, especially due to the opening ASE
13 In the local level, especially in Central Java, SMEs creative sectors face
14 The same situation is found in Banyumas Regency, Central Java. Although the
15 As a matter of fact, mentoring models in central and local levels have alre
16 Mentoring programs are greatly essential for the development of SMEs to imp
17 Based on the identification of problems, the purpose of this study is to fo
18
19 Literature Review
20 Creative Economy
21 Currently, the economic development has a great influence from the developm
22 Howkins (2001) coined the creative concept of economics. He insinuates that
23 Creative economy has a close relationship with the creative industry. Creat
24
25 The integrated mentoring model
26 Mentoring is one supporting mechanism required by SMEs to empower their bus
27 One mentoring model organized by the government is the Integrated Business
28 The other weaknesses of the existing mentoring model found in the study con
29 The other obstacle is the weakening support from stakeholders. This was the
30 From the results of the mentoring study, it is concluded that:
31 (1) A mentoring approach has not been well implemented in integrated manner
32 (2) The mentors' roles are mostly performed by the consultants whose social
33 (3) Lack of stakeholders' wider involvement in mentoring model which resour
34
35 Multi-stakeholder Collaboration
36 The actual mentoring model used by government and private agencies seems to
37 An integrated mentoring model is also interpreted as a collaboration of mul
38 The concept of Penta Helix is relevant to creative economy sectors since it
39 Methods
40 This research aims at formulating an integrated mentoring model for the SMEs
41 Denzin and Lincoln (2017) describe that qualitative research emphasizes the social construction aspects of
42 This research used in-depth interviews and focus group discussions (FGD) with creative economy actors. The
43 The main tool of data analysis in qualitative approach is the researchers themselves instead of other tool
44 To obtain more reliable and valid data, this research only collected informants directly involved in the re
45
46 Table 1. Number of Informants
47 No
48 Sector
49
50
51
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4   "abstract": "This study aims to formulate an integrated mentoring model by involving multi-stakeholder collaboration for the SMEs in the creative economy
5   in Banyumas Regency, Central Java, Indonesia. This qualitative research approach is conducted with a case study using SMEs creative economy in Banyumas F
6   was made and the results show that an integrated mentoring model comprises substantial aspects namely: (1) marketing development, (2) business permit and
7   stakeholders may encourage flows of current experience, knowledge and entrepreneurial spirit into the SMEs creative economy. Therefore, the findings of t
8   "keywords": [
9     "ASEAN Economic Community", "corporate social responsibility", "creative economy sector", "creative economy", "financial management", "Indonesia", "informati
10  ],
11  "references": [
12    "Arifin, L.J. (2017). Peran pusat layanan usaha terpadu (PLUT) terhadap perekonomian ukm perikanan Kabupaten Tulungagung, Jawa Timur [The role of inte
13    "Arunagiri, S., Kalaippiriyva, K., Krishna, R.L., Vithya, J.M., and Kalaivani, K. (2015). A study on small and medium enterprises (SMEs) growth domestic
14    "Bank Indonesia. (2006). Kajian inkubator bisnis dalam rangka pengembangan UMKM [A study of business incubator in the framework of developing SMEs]. Ti
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26    }
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29    "introduction": [
30      "In the last two decades, creative economy has received considerably high attention from scholars. Hartley, Wen and Li (2015) mention that creative e
31      more environmentally friendly, resilient and promising for better economic development.<br/><br/>Creative industries also contribute to GDP growth be
32      developing countries gain more benefits from trading creative products than the developed countries do. In 2012, the developing countries have receiv
33      small and medium enterprises, many of them are still powerless."
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41    }
42  ],
43  "summary": [
44    "In the last two decades, creative economy has received considerably high attention from scholars.",
45    "To encourage the Banyumas products to have high competitiveness in local area, Social media may be utilized to promote Banyumas SMEs products\" (UL, 4
46    "In a collaborative model adjusted to the SMEs goals to have higher competitiveness at ASEAN level, the SME stakeholders should understand five program
47    "Our model shows that development of SMEs in creative economy sectors should integrate the actual needs of mentoring proposed by SMEs with the potentia
48    "Our study indicates that there is a strong demand from SMEs to get an integrated mentoring program to improve their business capacity including financ
49    "These actors can play the role of mentor to transfer their respective knowledge, experience, skill, and expertise to the SMEs. Through such integratec
50    "Our mentoring model integrating mentor sources with the actual need of SMEs actors provides fresh insights into the multi-stakeholder involvement meet
51    "This research explored the strategic aspects that should be taken mentoring model into account for development of SMEs in creative economy sector.",
52    "Our study results show that SMEs in creative economy sector need mentoring activities to empower them in the field of financial management, marketing,
53    "The results of this study confirm that the development of SMEs at local level through a mentoring model requires the collaboration of Penta Helix actor
54    "This study suggests that integrating the Penta Helix actors into mentoring model will have positive impacts on empowerment level of SMEs in creative e
55    "The social media community is able to help the SMEs to promote the utilization of social media technology for wider market development of creative ecc
56  ],
57  "headline": "This study suggests that integrating the Penta Helix actors into mentoring model will have positive impacts on empowerment level of SMEs in
```





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Approaches to summarisation

Neural seq2seq or Transformer models will generate syntactically consistent – but factually garbled – text.



Approaches to summarisation

Neural seq2seq or Transformer models will generate syntactically consistent – but factually garbled – text.

Mild cognitive impairment in Parkinson disease places a high burden on patients and is likely a precursor to Parkinson disease-related dementia. As Parkinson's disease progresses, attention deficit hyperactivity disorder (ADHD) may become associated with decreased motor functioning and attention deficit hyperactivity disorder. These findings suggest that the presence of a neurobiological mediator on cognition can affect cognitive function in adults.

An entity, e.g. 'carbon capture'

Approaches to summarisation

Neural seq2seq or Transformer models will generate syntactically consistent – but factually garbled – text.

To fix this, we need to add knowledge engineering:

- Identify 'facts' – **subject-verb phrase-object** triples (Open Domain IE)
- Identify 'claims': what was done, what was found
- Rank using a graph-based algorithm
- Simplify (remove transitional phrases, expand abbreviations)
- Ensure these are copied to the output unchanged and no new entities generated.

Longer, significant phrases e.g. 'shown to be effective in'

Summarisation 1: headline and highlights

npj | Digital Medicine www.nature.com/npjdigitalmed

ARTICLE OPEN

How the weather affects the pain of citizen scientists using a smartphone app

William G. Dixon^{1,2,3*}, Anna L. Beukenhorst⁴, Belay B. Yimer¹, Louise Cook⁵, Antonio Gasparrini^{6,5}, Tal El-Hay⁶, Bruce Hellman⁷, Ben James⁷, Ana M. Vicedo-Cabrera⁸, Malcolm Maclure⁹, Ricardo Silva^{9,10}, John Ainsworth⁶, Hual Leng Pisantiello^{1,11}, Thomas House^{6,12}, Mark Lunt⁶, Carolyn Gamble^{1,14,15}, Caroline Sanders^{14,15}, David M. Schultz¹⁶, Jamie C. Sergeant^{1,17,18} and John McBeth^{1,18}

Patients with chronic pain commonly believe their pain is related to the weather. Scientific evidence to support their beliefs is inconclusive, in part due to difficulties in getting a large dataset of patients frequently recording their pain symptoms during a variety of weather conditions. Smartphones allow the opportunity to collect data to overcome these difficulties. Our study *Cloudy with a Chance of Pain* analysed daily data from 2658 patients collected over a 15-month period. The analysis demonstrated significant yet modest relationships between pain and relative humidity, pressure and wind speed, with correlations remaining even when accounting for mood and physical activity. This research highlights how citizen-science experiments can collect large datasets on real-world populations to address long-standing health questions. These results will act as a starting point for a future system for patients to better manage their health through pain forecasts.

npj Digital Medicine (2019)2:105 | <https://doi.org/10.1038/s41746-019-0180-3>

INTRODUCTION

Weather has been thought to affect symptoms in patients with chronic disease since the time of Hippocrates over 2000 years ago.¹ Around three-quarters of people living with arthritis believe their pain is affected by the weather.^{2–7} Many report their pain is made worse by the cold, rain, and low atmospheric pressure. Others report that their pain is made worse by warmth and high humidity. Despite much research examining the existence and nature of the weather–pain relationship,⁸ there remains no scientific consensus. Studies have failed to reach consensus in part due to their small sample sizes or short durations (commonly fewer than 100 participants or one month or less); by considering a limited range of weather conditions; and heterogeneity in study design (e.g. the populations studied, methods for assessing pain, assumptions to determine the weather exposure, and statistical analysis techniques).^{5–11} Resolving this question requires collection of high-quality symptom and weather data on large numbers of individuals. Such data also need to include other factors potentially linked to daily pain variation and weather, such as mood and amount of physical activity. Collecting this kind of multi-faceted data in large populations over long periods of time, however, has been difficult.

The increasing uptake of smartphones offers new and significant opportunities for health research.¹² Smartphones allow the integration of data collection into daily life using applications (apps). Furthermore, embedded technologies within the smartphones, such as the Global Positioning System (GPS), can be used

to link the data collection to specific locations. We created Cloudy with a Chance of Pain,^{13,14} a national United Kingdom smartphone study, to collect a large dataset to examine the relationship between local weather and daily pain in people living with long-term pain conditions.

RESULTS

Recruitment and retention

The study app was downloaded by 13,207 users over the 12-month recruitment period (Figs 1 and 2a) with recruitment from all 124 UK postcode areas. A total of 10,584 participants had complete baseline information and at least one pain entry, with 6850 (65%) participants remaining in the study beyond their first week and 4692 (44%) beyond their first month (Fig. 2b). Further description of engagement clusters is provided in Supplementary Table 2 and Supplementary Figs 1–3. A total of 2658 participants had at least one hazard period matched to a control period in the same month (Fig. 3) and were included in the final analysis. There were 9695 hazard periods included in the analysis for the final 2658 participants, matched to 81,727 control periods in 6431 participant-months. A total of 1235 participants contributed one month, and the remaining 1423 participants contributed 2–15 months.

The final cohort was active for a median of 165 days (interquartile range, IQR 84–245) with symptoms submitted on an average of 73% of all days. Cohort members were

¹Centre for Epidemiology Versus Arthritis, Manchester Academic Health Science Centre, The University of Manchester, Manchester, UK. ²Health eResearch Centre, Manchester Academic Health Science Centre, The University of Manchester, Manchester, UK. ³NHRI Greater Manchester Biomedical Research Centre, Manchester Academic Health Science Centre, The University of Manchester, Manchester, UK. ⁴Department of Public Health Environments and Society, London School of Hygiene & Tropical Medicine, London, UK. ⁵Centre for Statistical Methodology, London School of Hygiene & Tropical Medicine, London, UK. ⁶NBM Research, Haifa, Israel. ⁷Akoff Limited, London, UK. ⁸Department of Anesthesiology, Pharmacology and Therapeutics, University of British Columbia, Vancouver, BC, Canada. ⁹Department of Statistical Science, UCL, London, UK. ¹⁰Allan Turing Institute, London, UK. ¹¹Discipline of Medicine, The University of Adelaide, Adelaide, Australia. ¹²School of Mathematics, The University of Manchester, Manchester, UK. ¹³NBM Research, Hartree Centre, Sci-Tech, Daresbury, UK. ¹⁴Greater Manchester Patient Safety Translational Research Centre, The University of Manchester, Manchester, UK. ¹⁵NHRI School of Primary Care, Manchester Academic Health Science Centre, The University of Manchester, Manchester, UK. ¹⁶Centre for Atmospheric Science, School of Earth and Environmental Sciences, The University of Manchester, Manchester, UK. ¹⁷Centre for Biostatistics, Manchester Academic Health Science Centre, The University of Manchester, Manchester, UK. ¹⁸These authors contributed equally: Jamie C. Sergeant, John McBeth. *email: will.dixon@manchester.ac.uk

Scripps Research Translational Institute npj nature partner journals



How the weather affects the pain of citizen scientists using a smartphone app

William G. Dixon, Anna L. Beukenhorst, Belay B. Yimer, et al.

2019

10.1038/s41746-019-0180-3

“ This study has demonstrated that higher **relative humidity** and **wind speed**, and lower **atmospheric pressure**, were associated with increased pain severity in people with long-term pain conditions ”



Key concepts

Abstract

Research highlights

- Weather has been thought to affect symptoms in patients with chronic disease since the time of Hippocrates over 2000 years ago.
- This study has demonstrated that higher **relative humidity** and **wind speed**, and lower **atmospheric pressure**, were associated with increased pain severity in people with long-term pain conditions
- The most significant contribution was from **relative humidity**
- The effect of weather on pain was not fully explained by its day-to-day effect on mood or **physical activity**
- The ‘worst’ combination of weather variables would increase the odds of a pain event by just over 20% compared to an average day
- The odds of a pain event was 12% higher per one standard deviation increase in **relative humidity** (9 percentage points) (**OR** 1.119 (1.084–1.154), compared to 4% lower for pressure (**OR** 0.958 (0.930–0.989) and 4% higher for **wind speed** (**OR** 1.041 (1.010–1.073) (11 mbar and 2 m s⁻¹ respectively) odds ratio
- Such an increased risk may be meaningful to people living with **chronic pain**

Tables

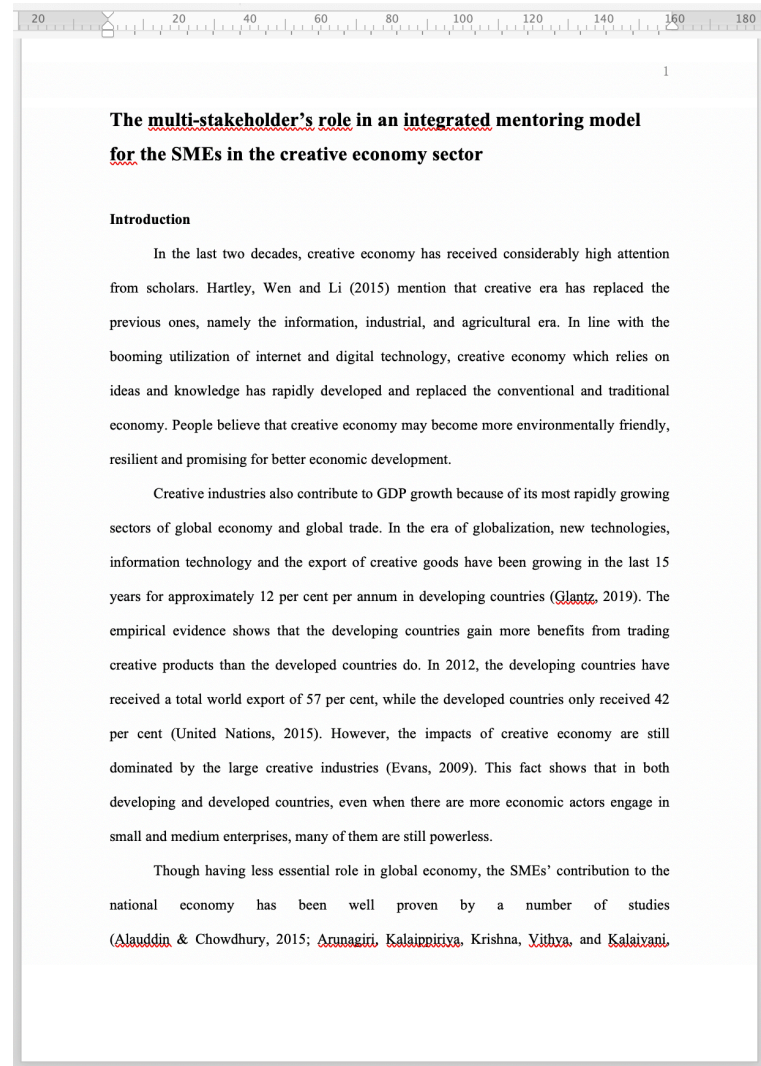


Figures

Introduction

Methods

Summarisation 1: headline and highlights



The multi-stakeholders role in an integrated mentoring model for the SMEs in the creative economy sector

2015

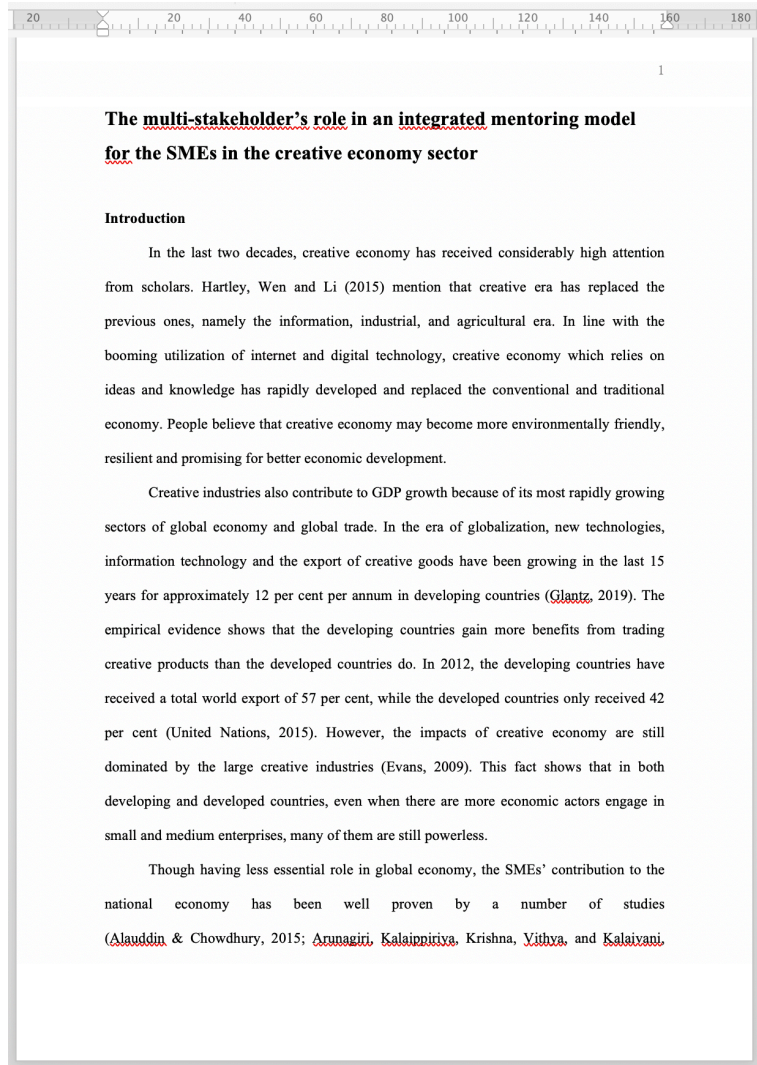
" Our study results show that SMEs in [creative economy](#) sector need mentoring activities to empower them in the field of [financial management](#), marketing, protection of [intellectual property](#), legal business entity, utilization of [information technology](#), and [business permit](#) "



Scholarcy highlights

- In the last two decades, [creative economy](#) has received considerably high attention from scholars. [Hartley, Wen and Li \(2015\)](#) mention that creative era has replaced the previous ones, namely the information, industrial, and agricultural era
- Based on the results of focus group discussion with the informants, there are some important aspects to include in the mentoring model: (1) [financial management](#), (2) marketing, (3) protection of [intellectual property](#), (3) legal business entity, (4) utilization of [information technology](#), and (5) [business permit](#)
- Our study results show that SMEs in [creative economy](#) sector need mentoring activities to empower them in the field of [financial management](#), marketing, protection of [intellectual property](#), legal business entity, utilization of [information technology](#), and [business permit](#)
- Such mentoring activities should be integrated into a mentoring program for SMEs to improve their capacity to compete in [creative economy](#) business
- The results of this study confirm that the development of SMEs at local level through a mentoring model requires the [collaboration](#) of Penta Helix actors consisting of [local government](#), universities, business actors, creative community, and [social media](#) community
- The [social media](#) community is able to help the SMEs to promote the utilization of [social media](#) technology for wider market development of [creative economy](#) products

Summarisation 2: structured summary



Scholarcy summary

- **Introduction:** In the last two decades, [creative economy](#) has received considerably high attention from scholars. [Hartley, Wen and Li \(2015\)](#) mention that creative era has replaced the previous ones, namely the information, industrial, and agricultural era.
- In the era of globalization, new technologies, [information technology](#) and the export of creative goods have been growing in the last 15 years for approximately 12 per cent per annum in developing countries ([Glantz, 2019](#)).
- The impacts of [creative economy](#) are still dominated by the large creative industries ([Evans, 2009](#))
- This fact shows that in both developing and developed countries, even when there are more economic actors engage in [small and medium enterprises](#), many of them are still powerless
- **Objectives:** This study aims to formulate an integrated mentoring model by involving multi-stakeholder [collaboration](#) for the SMEs in the [creative economy](#) sector.
- **Methods:** Discussion with SMEs actors about appropriate mentoring aspects lead us to make an in-depth exploration of some themes such as (1) their experiences on existing mentoring, (2) the SMEs actors perspective of mentoring model based on their actual need, and (3) potential role of stakeholders in mentoring program.
- The SMEs actors perceptions and opinions on mentoring aspects were deeply explored to interpret the obtained mentoring experiences and model.
- Case study was used to investigate deeply various actors' perspectives regarding the mentoring model needed by them.
- As a type of qualitative research, case study explores the complexity and uniqueness of a particular model from multiple viewpoints ([Simons, 2009](#))
- **Results:** Results and Discussion
- From our interview with the SMEs actors, common problem was found in business and finance management due to the lack of human resources.
- Based on the results of focus group discussion with the informants, there are some important aspects to include in the mentoring model: (1) [financial management](#), (2) marketing, (3) protection of [intellectual property](#), (3) legal business entity, (4) utilization of [information technology](#), and (5) [business permit](#)
- These five aspects are integrated into a mentoring program for SMEs actors so they have adequate capacity to run their business
- **Conclusion:** This research explored the strategic aspects that should be taken mentoring model into account for development of SMEs in [creative economy](#) sector.
- Our study results show that SMEs in [creative economy](#) sector need mentoring activities to empower them in the field of [financial management](#), marketing, protection of [intellectual property](#), legal business entity, utilization of [information technology](#), and [business permit](#).
- Such mentoring activities should be integrated into a mentoring program for SMEs to improve their capacity to compete in [creative economy](#) business.
- The [social media](#) community is able to help the SMEs to promote the utilization of [social media](#) technology for wider market development of [creative economy](#) products

Summarisation 3: micro-abstract

OPEN ACCESS Freely available online

PLOS ONE

Marine Plastic Pollution in Waters around Australia: Characteristics, Concentrations, and Pathways

Julia Reisser^{1,2,3*}, Jeremy Shaw⁴, Chris Wilcox^{3,5}, Britta Denise Hardesty^{3,5}, Maira Proietti⁶, Michele Thums^{1,2,7}, Charitha Pattiaratchi^{1,2}

1 School of Environmental Systems Engineering, University of Western Australia, Perth, Western Australia, Australia, 2 Oceans Institute, University of Western Australia, Perth, Western Australia, Australia, 3 Wealth from Oceans Flagship, Commonwealth Scientific and Industrial Research Organisation, Floreat, Western Australia, Australia, 4 Centre for Microscopy, Characterisation and Analysis, University of Western Australia, Perth, Western Australia, Australia, 5 Marine and Atmospheric Research, Commonwealth Scientific and Industrial Research Organisation, Hobart, Tasmania, Australia, 6 Instituto de Oceanografia, Universidade Federal do Rio Grande, Rio Grande do Sul, Brazil, 7 Australian Institute of Marine Science, Perth, Western Australia, Australia

Abstract

Plastics represent the vast majority of human-made debris present in the oceans. However, their characteristics, accumulation zones, and transport pathways remain poorly assessed. We characterised and estimated the concentration of marine plastics in waters around Australia using surface net tows, and inferred their potential pathways using particle-tracking models and real drifter trajectories. The 839 marine plastics recorded were predominantly small fragments ("microplastics", median length = 2.8 mm, mean length = 4.9 mm) resulting from the breakdown of larger objects made of polyethylene and polypropylene (e.g. packaging and fishing items). Mean sea surface plastic concentration was 4256.4 pieces km⁻², and after incorporating the effect of vertical wind mixing, this value increased to 8966.3 pieces km⁻². These plastics appear to be associated with a wide range of ocean currents that connect the sampled sites to their international and domestic sources, including populated areas of Australia's east coast. This study shows that plastic contamination levels in surface waters of Australia are similar to those in the Caribbean Sea and Gulf of Maine, but considerably lower than those found in the subtropical gyres and Mediterranean Sea. Microplastics such as the ones described here have the potential to affect organisms ranging from megafauna to small fish and zooplankton.

Citation: Reisser J, Shaw J, Wilcox C, Hardesty BD, Proietti M, et al. (2013) Marine Plastic Pollution in Waters around Australia: Characteristics, Concentrations, and Pathways. PLoS ONE 8(11): e80466. doi:10.1371/journal.pone.0080466

Editor: Graeme Clive Hays, University of Wales Swansea, United Kingdom

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10. Reisser J, Shaw J, Wilcox C, Hardesty B, Proietti M (2013) Marine plastic pollution in the waters around Australia: Characteristics, concentrations and pathways. PloS one 8: doi:10.1371/journal.pone.0080466.



- Shows that plastic contamination levels in surface waters of Australia are similar to those in the Caribbean Sea and Gulf of Maine, but considerably lower than those found in the subtropical gyres and Mediterranean Sea
- Shows the linear fit and theoretical model estimates for Cs, when depth-integrated plastic concentration is equal to 8966 and significant wave height is equal to the mean, maximum and minimum values estimated for the 57 net stations
- Found that the surface waters around Australia are contaminated with small plastics that are mostly a by-product of the degradation of larger objects made of polyethylene and polypropylene
- Shows that the distribution of marine plastics is quite widespread, patchy and dynamic

Bootstrapping training data

Use distant supervision with Snorkel or Prodigy.

```
1 from snorkel.labeling import labeling_function
2 from snorkel.labeling import LabelModel, PandasLFApplier
3 import spacy
4 import scispacy
5 import textacy
6
7 nlp = spacy.load('en_core_sci_sm')
8
9 @labeling_function()
10 def lf_finding_1(x):
11     doc = nlp(x)
12     entities = doc.ents
13     svo = textacy.extract.subject_verb_object_triples(doc)
14     subject = svo[0]
15     predicate = svo[1]
16     if entities[0] in subject and predicate in ['cause', 'demonstrate', 'find', 'show']:
17         return TRUE
18     else:
19         return ABSTAIN
20
21
22 labeling_functions = [lf_finding_1, lf_finding_2, lf_finding_3, ...]
23 applier = PandasLFApplier(labeling_functions)
24 L_train = applier.apply(df_train)
25
26 # Train the label model and compute the training labels
27 label_model = LabelModel(cardinality=2, verbose=True)
28 label_model.fit(L_train, n_epochs=500, log_freq=50, seed=123)
29 df_train["label"] = label_model.predict(L=L_train, tie_break_policy="abstain")
30
31
```




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Evaluation

Single-blind selection of 125 papers across 5 domains.
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