Distribution Agreement

In presenting this thesis or dissertation as a partial fulfillment of the requirements for an advanced degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis or dissertation in whole or in part in all forms of media, now or hereafter known, including display on the world wide web. I understand that I may select some access restrictions as part of the online submission of this thesis or dissertation. I retain all ownership rights to the copyright of the thesis or dissertation. I also retain the right to use in future works (such as articles or books) all or part of this thesis or dissertation.

Signature:

_____   _____
Nadya Prood   Date

What types of social support for opioid overdoses do people who use drugs offer one another?
An analysis of online discussion boards
By

Nadya Prood
MPH

Behavioral Sciences and Health Education

_____
Hannah Cooper
Committee Chair

_____
Nancy Thompson
Committee Member

_____
Colleen McBride
Department Chair

What types of social support for opioid overdoses do people who use drugs offer one another?
An analysis of online discussion boards

By

Nadya Prood

BS
American University
2013

Thesis Committee Chair: Hannah Cooper, ScD

An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Behavioral Sciences and Health Education
2018

Abstract

What types of social support for opioid overdoses do people who use drugs offer one another?
An analysis of online discussion boards
By Nadya Prood

The United States is currently facing an opioid epidemic. One way to tackle this epidemic may be to understand how opioid users are communicating with one another about overdoses. We proposed that this could be accomplished by examining expressions of social support on online discussion boards. The research aim was to examine what kinds of social support (emotional support, instrumental support, informational support, appraisal support) were being communicated through interactions on online opioid overdose discussion boards.

A qualitative study design was chosen to answer the proposed research aim. Sampling was performed at three levels: discussion board, forum and thread. A census of all threads that met the inclusion and exclusion criteria were analyzed. The data collected were from a total of seven threads with 143 posts by 81 unique usernames. Thematic analysis was chosen as the analysis method for this study because it allows for easy use of additional theory.

Analysis of the discussion boards showed that all four types of social support were present: informational, emotional, instrumental and appraisal and subthemes for each type of support emerged. For information support, the subthemes of overdose prevention, mechanism of how an overdose occurs, and responding to an overdose became apparent. For emotional support, the subthemes of safety, caring, and trust appeared. For instrumental support the subthemes of skill-based knowledge and insider knowledge became apparent. For appraisal support the subthemes of affirmations and feedback emerged.

Limitations of the study were that posters' demographics were not available, the size of readership of the discussion board was unknown, no double coding was performed, and the findings were not generalizable. Strengths of the study were, it was the first of its kind in the opioid literature, a census was used to collect data and it was guided by theory. Future research should aim to examine the accuracy of informational support; to analyze the role of virtual communities to provide social support, and to gather and analyze demographics of the users of discussion boards.

What types of social support for opioid overdoses do people who use drugs offer one another?
An analysis of online discussion boards

By

Nadya Prood

BS
American University
2013

Thesis Committee Chair: Hannah Cooper, ScD

A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Behavioral Sciences and Health Education
2018

Table of Contents

Table of Figures

CHAPTER 1: INTRODUCTION

The United States is currently facing an opioid epidemic. A 200% increase in deaths caused by opioids occurred between 2000 and 2014.[1] One reason for this is the increase in the number of prescriptions written by physicians for opioids.[2] Between 1991 and 2010, the number of opioid prescriptions in the United States increased from 76 million to 210 million.[3] In 1991 there were approximately 0.30 opioid prescriptions per person and in 2010 there were approximately 0.68 opioid prescriptions per person.[3,4]

Social support, which is part of the Social Network Theory, has been linked with positive health outcomes.[5-7] There are four types of social support: informational support, emotional support, instrumental support and appraisal support.[5] Past research has shown that these types of social support can be found on online discussion boards, which are defined as "a website or section of a website that is used for public discussion of a specific topic and on which users can submit or read messages," and have been used to further understand various public health outcomes.[6-8]

Current research has looked at social support on pro-suicide, pro-anorexia and pro-bulimia discussion boards.[9-13] Interestingly, Eichenberg et al. found that the results from an analysis of suicide discussion boards "contradict the assumptions that suicide message boards are generally a source of potential harm and that they foster suicidal tendencies and point instead to their predominantly constructive or even suicide-preventative functions."[14] As a result of this and similar findings, this thesis qualitatively analyzed data from opioid-based discussion boards in order to understand if similar findings could be demonstrated. Prior to this analysis, only one published study analyzed opioid-based discussion boards, but they did not consider the role of social support.[15]

We used the Social Network Theory to examine the content of opioid-based online discussion boards. Specifically, we examined what kinds of social support (i.e., emotional, instrumental, informational and appraisal) are being communicated through opioid-based online discussion boards about opioid overdoses.

CHAPTER 2: LITERATURE REVIEW

Opioid Overdoses

Between 2000 and 2014, the United States experienced a 200% increase in deaths involving opioids.[1] Among all drug overdose deaths in 2014, 61% (28,647) involved opioids.[16] One reason for the increase in overdoses was (and remains) increased access to prescription opioids. The number of prescriptions written for opioids began to rise in the 1990's as healthcare professionals grappled to adequately treat patients suffering from chronic pain.[2] Prescribing opioids became a more lenient practice as healthcare professionals were wrongly led to believe that opioids were not as addictive as previous literature suggested; both pharmaceutical companies and the published literature supported this opinion.[2,17] The article, "The Tragedy of Needless Pain" was published in February of 1990 in Scientific American by Dr. Ronald Melzack. He argued that morphine was not addictive when taken only for the purpose of pain. This conclusion contributed to the drastic increase of prescriptions written by physicians for opioids.[18] Between 1991 and 2010 the total number of opioid prescriptions dispensed in the United States almost tripled, from 76 million to 210 million.[3]

In December 1995, Purdue, the manufacturer of oxycodone, one of the main opioids prescribed for pain, initiated a formula change that amplified oxycodone's danger. This modified opiate, OxyContin, was the extended release version of oxycodone. This extended release version allowed for dosing every 12 hours instead of every four to six hours. Although one of the intentions of the extended release formula was to decrease the abuse of opioids, users quickly discovered that the new formula was a purer form of oxycodone that could be crushed and injected.[19]

Findings from the Centers for Disease Control and Prevention found that when comparing demographic data of heroin users between 2002-2004 and 2011-2013 their use increased in almost all demographic subgroups. Specifically, there were increases in opioid use among a) both men and women, b) ages 18-25 and ages 26 and older, c) non-Hispanic whites, d) all house-hold incomes, and e) those with and without health insurance.[20] In regards to those who died as a result of heroin or synthetic opioids (not including methadone), demographic data showed an increase among a) both males and females, b) those 15 years and older, and c) among all racial and ethnic populations.[21]

According to a review article by Darke et al., opioid overdoses are seldom caused by heroin alone. Many overdoses involve multiple, central nervous system (CNS) depressants. Darke et al. recommended not using the term "overdose" but instead using "multiple drug toxicity," as the former does not accurately represent the majority of cases.[22] This recommendation supports the harm reduction literature that indicates that mixing drugs with heroin or other opioids increases the risk of overdosing.[23]

As indicated by the growing number of people using and overdosing on opioids, this epidemic is of substantial public health concern. A potential key to understanding the opioid epidemic may be to understand how opioid users are communicating amongst their peer groups about this topic. In our study we have specifically chosen to understand the kinds of support that opioid users offer each other to prevent or recover from overdoses. Given that focus, our analysis was guided by Social Network theory.[5]

Social Network Theory

"Social network" is the broad term used to describe the social interactions a person has with other individuals. Social networks can have structural characteristics including reciprocity, intensity, complexity, formality, density, homogeneity, geographic dispersion, and directionality. A social network can function as social capital, social influence, social undermining, companionship, and social support. Social support is one of the resources that can flow through a network.[5]

Social Support

Two review articles published in 1976, one by John Cassel and the other by Sidney Cobb, illuminated the role of social support in health-related outcomes.[5,6,24] There are several types of social support that have been defined. *Informational support* is displayed by communicating advice, information and directives that a person can use to address personal or environmental problems. *Emotional support* is presented by the disclosure of concern, empathy, care, love, and trust via physical or psychological care. *Instrumental support* is exhibited by sharing aid or services that directly help a person in need such as giving money, time or labor. The key factor for instrumental support is hands-on help. *Appraisal support,* (also called comparison support or esteem support) is revealed through the transmission of information that is useful for self-evaluation purposes. This information could be in the form of affirmations or feedback.[5-7,24,25] Social support has frequently been studied in chronic illnesses, especially as it relates to stress

and coping, but has also been studied in smoking cessation, alcohol abuse, and postpartum depression among other areas.[6,7]

Peer Support

Peers can serve as a crucial source of social support. Peer support has been defined in a number of ways including the adaptation by Tracey et al. of the widely used definition of White et al.: peer support is, "the process of giving and receiving nonprofessional, nonclinical assistance from individuals with similar conditions or circumstances to achieve long-term recovery from psychiatric, alcohol, and/or other drug related problems."[26,27]

Pantridge et al. qualitatively examined the types of social support displayed by peer support specialists (PSS) during three phases of addiction rehabilitation treatment: treatment, transition, and recovery management. Their analysis found that emotional support and instrumental support were present throughout all three phases of treatment. PSS were able to share these types of support because they had been through the same experiences of addiction and recovery.[28] A recent review article analyzed nine previously published studies utilizing peer support; they found that peers had a positive effect on participants and their substance use outcome.[29] It is important to also consider instances when peers can negatively influence behavior, including trying new drugs or continuing to use drugs.[30-32] These instances are often not intentional but are crucial to bear in mind when considering peer support. A common way for peer support to be given or received is through the Internet.

Online Discussion Boards

Discussion Boards (also referred to as "message boards") are websites that host a space for conversations among individuals on a variety of topics; a widely used discussion board is "Reddit." The discussion board may or may not have different forums. When present, these forums help users navigate to topics of their interest. Forums on a discussion board can range from "Recipes" to "Star Wars." Within forums there are individual threads. These can be used to start conversations on a more specific facet of a forum. Finally, within threads are individual posts, in which users of discussion boards can write messages or reply to messages posted by other users.[14,15,33] The posts are usually anonymous, and many users choose an unidentifiable username.

Broadly, there are two types of discussion boards, professional and non-professional. Professional discussion boards are those that are run or maintained by health professionals or health-focused organizations. Non-professional discussion boards are those not necessarily created for the purpose of improving health and are initiated by individuals on topics of their choice.[9,10] In addition to illicit drugs, pro-suicide, pro-self-harm, pro-anorexia, and pro-bulimia non-professional discussion boards have found a following on the internet and in the academic literature.[9,11-13] Research has found that discussion board users who communicate with people who share similar experiences online have a reduction in feelings of alienation.[9,10,14]

Current Media: Online Discussion Boards and Opioid Overdoses

The news media has covered instances where discussion boards were cited in relation to opioid overdoses and the impact of peer support. One article, "How a Reddit forum has become a lifeline to opioid addicts in the US," published in *The Guardian*, July 2017, discusses the role that the online discussion board Reddit played in preventing opioid overdoses. The forums on opioids ranged in topics from harm reduction techniques to "cocktail" recipes, but the focus of *The Guardian* article was on a specific thread that dealt with sharing knowledge about fentanyl-laced heroin. According to the article, from January to July 2017 there were warnings posted on this thread about fentanyl-laced heroin in New York, Delaware, Virginia, Massachusetts and North Carolina. Fentanyl, unlike heroin, is a synthetic opioid that is used to treat chronic pain or pain caused from cancer. The drug is 50 to 100 times more powerful than morphine, which is used as the standard measure. Carfentanil is approximately 100 times more potent than fentanyl. Thus there is concern that these drugs will be mixed into heroin, because they can often lead to overdoses.[34] The article noted that the director of a health department in West Virginia "has heard of addicts setting up networks to share information on bad heroin batches in the past while working with the department's needle exchange program."[35] This article shines a light into the depth of discussion boards on the topic of opioid overdoses and supports the observation that there is evidence of informational support being shared on discussion boards. Further examination of the types of social support being shared related to overdoses could be a crucial way to learn how to best intervene.

Pro-Anorexia Discussion Boards and Social Support

Drug misuse and eating disorders are highly comorbid.[36] This comorbidity, and the fact that both behaviors are both highly stigmatized and have high risk for adverse consequences, provide a basis for examining pro-anorexia (pro-ana) discussion boards to inform research on opioid discussion boards. Pro-ana and pro-bulimia (pro-mia) discussion boards have been evaluated using the construct of social support.[11,37,38] One article analyzing pro-ana websites determined that one of the primary themes was social support, specifically emotional support. The pro-ana website marketed itself as a "safe place" and a "secret society," where members of the community could discuss their eating disorders without fear of ridicule from the outside world. Specifically, this study found that members sought social support in two categories: losing weight using disordered eating techniques and encouraging recovery and healthy eating habits. These conversations also indicated that informational support was being communicated since users would rely on each another for advice and suggestions.[11]

Opioids, Discussion Boards, and Social Support

The only study to date exploring opioid-specific discussion boards analyzed the accuracy of the information posted. The study focused on buprenorphine, a medication used to treat those who are dependent on opioids. Users of this discussion board were found to trust the opinion of each other over those of healthcare professionals. In addition, the study indicated that the discussion board had a mixture of accurate and inaccurate information when examined by health care professionals.[15]

Progress in mitigating the opioid epidemic would benefit from understanding if and how people seek social support through online discussion boards because discussion boards allow researchers to gain an insider perspective. Analyses of discussion boards are effective in accomplishing this because participants do not modulate their responses to suit the interviewer.

This thesis is grounded on the observation that social support, evident on discussion boards, could also be occurring on opioid discussion boards. This type of media-based communication is likely to be important when confronting the opioid epidemic. Over recent years, the United States has seen opioid overdoses spread from cities to suburban and rural areas where people may have access to fewer resources; online platforms could be a place for public health professionals to intervene to reach populations that have poorer access to harm reduction and other healthcare services.[39]

Research Aim

Using the Social Network Theory, the aim of this study is to examine what kinds of social support (emotional support, instrumental support, informational support, appraisal support) are being communicated through interactions on opioid-based online discussion boards about opioid overdoses.

CHAPTER 3: METHODS

Study Design

The goal of this study was to understand the types of exchanges on online

discussion boards between users discussing opioid overdoses. We chose a qualitative

study design to answer the proposed research aim. It has been observed that "Qualitative

methods involve making observations or collecting data that typically cannot be

expressed numerically."[40] Qualitative methodology was the most appropriate approach

because this study was exploratory in nature and focused on understanding the natural

relationships existing between individuals in this environment.[41]

Data Collection & Sampling

A census was conducted in order to sample the data. Sampling was performed at

three levels: discussion board, forum and thread. Because is not clear how to differentiate

between "discussion boards," "messages boards," and "forums" because they often are

used interchangeably, herein we will define discussion board as, "a website or section of

a website that is used for public discussion of a specific topic and on which users can

submit or read messages."[8] Figure 1, below shows how discussion boards are the base of

a tree-like structure. The forum is the second layer, where the topics of the discussion

board are broken down into overarching categories. The thread is the third layer of a

discussion board, where users can start threads about topics of their choice. Finally, posts

are the individual responses users write in response to either a previous post or the topic

being discussed on the thread. We did not sample posts because the goal of the study was

to understand interactions between users and we felt that analyzing individual posts would not allow for this.

Figure 1: Visual Representation of a Discussion Board

```
                    ┌─────────────────┐
                    │ Discussion Board:│
                    │      Reddit      │
                    └─────────────────┘
          ┌───────────────┼───────────────┐
   ┌────────────┐  ┌────────────┐  ┌────────────┐
   │   Forum:   │  │   Forum:   │  │   Forum:   │
   │   Heroin   │  │   Cocaine  │  │  Marijuana │
   └────────────┘  └────────────┘  └────────────┘
     ┌──────┴──────┐
┌────────────┐ ┌────────────┐
│  Thread:   │ │  Thread:   │
│ First time │ │ Heroin FAQ's│
│ overdosing │ └────────────┘
│  stories   │
└────────────┘
     │
┌────────────┐
│   Post:    │
│ The first  │
│ time I     │
│ overdosed  │
│ was about  │
│ 3 years ago…│
└────────────┘
```
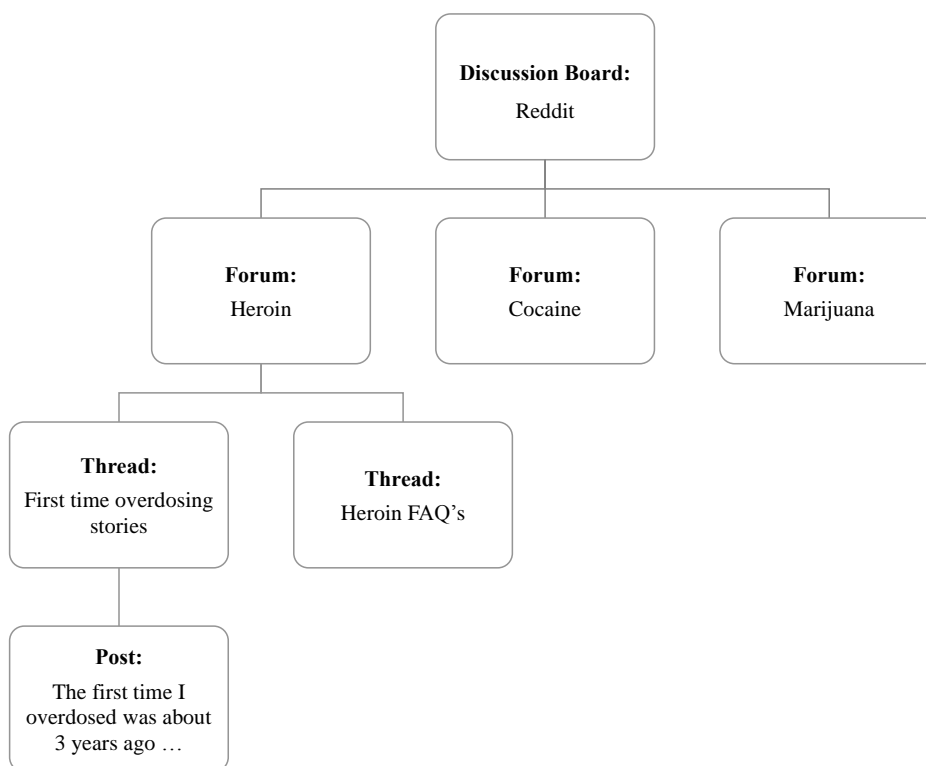
We searched Google combining the word "overdose" with six types of opioids (opioid, heroin, oxycodone, OxyContin, fentanyl, and carfentanil) and the three terms used interchangeably for the medium (forums, discussion boards, message boards). Literature on opioid-related deaths informed the choice of the six types of opioid search terms.[42] In total, 18 combinations of search terms were used (e.g., overdose AND heroin AND forum). Discussion boards were sampled using only the first page of 'Google' on 'Firefox' because it has been found that 91% of people do not click past the first page on Google.[43] Websites found using the search criteria were screened to determine if they qualified as a discussion board (see definition, above). Posted comments at the end of
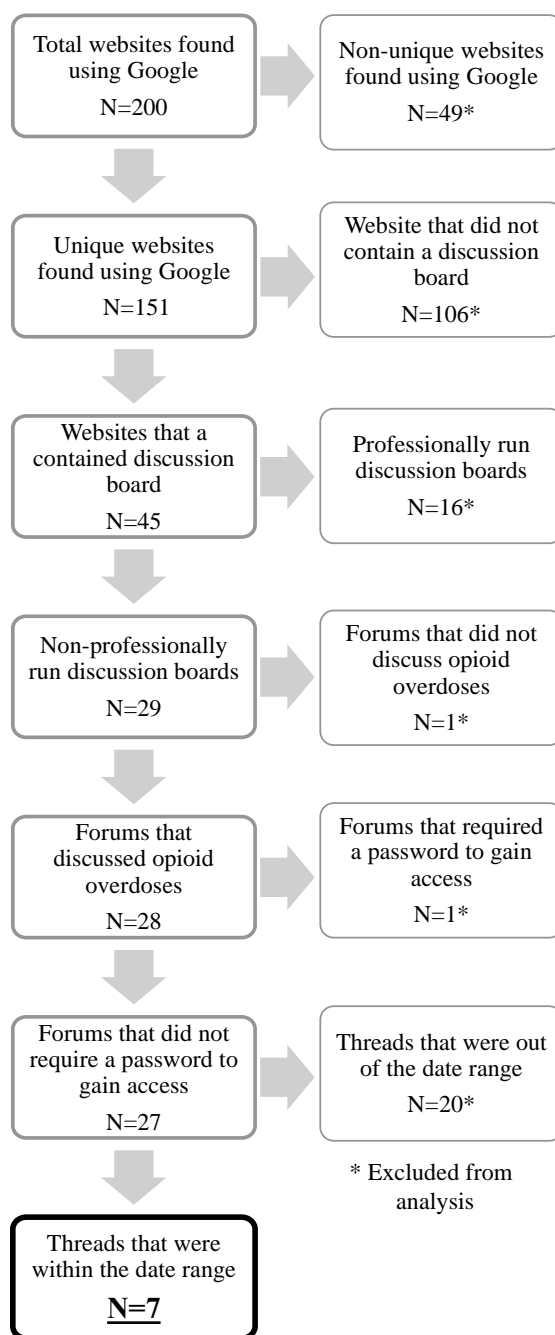
articles (often found after news articles) or Facebook posts were excluded. Next, if websites were deemed a discussion board, we determined if they were professional or non-professional, as defined above. Non-professional discussion boards were chosen for this study because previous research has shown that non-professional discussion boards serve as a place where people can go for advice from those whom they feel understand their experiences.[14] We analyzed who ran the website and what their mission was. Sites that were run by health organizations, health professionals and/or had the goals of drug rehabilitation/ recovery or helping those with addiction were excluded.[9] All data that resulted from the searches were tracked using Microsoft Excel. A total of 200 websites were identified; after duplicates were removed, a total of 151 unique websites remained. After applying the above criteria, the total number of discussion boards deemed eligible was 45.

If a discussion board was deemed eligible for inclusion in our study, forum(s) on the site were sampled by confirming whether the topic of discussion related to opioid overdoses. Forums were identified as eligible if their title or content used the term "overdose" or "OD," discussed risk factors for overdoses (e.g.,, using high doses of drugs, using multiple drugs together) or discussed the outcome of death as the result of using drugs. Any forums that required an account to gain access to the full thread was excluded. The total number of forums that were eligible was 27.

Finally, the threads on the 27 forums were sampled. Threads that were posted between November 12, 2016 and November 12, 2017 and had more than one post by more than one user were eligible. A census of all threads that met these criteria were

analyzed; the data collected was from a total of seven threads with 143 posts by 81 unique usernames (Figure 2).

Figure 2: Sampling Breakdown

Total websites found using Google N=200	Non-unique websites found using Google N=49*
Unique websites found using Google N=151	Website that did not contain a discussion board N=106*
Websites that a contained discussion board N=45	Professionally run discussion boards N=16*
Non-professionally run discussion boards N=29	Forums that did not discuss opioid overdoses N=1*
Forums that discussed opioid overdoses N=28	Forums that required a password to gain access N=1*
Forums that did not require a password to gain access N=27	Threads that were out of the date range N=20*
	* Excluded from analysis
Threads that were within the date range **N=7**	

Threads were downloaded between November 12-14, 2017. Forums were initially downloaded as a PDF document and then converted into a Microsoft Word document, so the posts could be cleaned and transferred into NVivo for analysis. To enhance reliability, the content downloaded from the PDF's was transferred exactly as it appeared in the original thread to Microsoft Word for analysis.

Purposive sampling, "a technique that is targeted and specifies pre-established criteria for recruiting the sample," was not used in this study for two primary reasons.[40] First, due to the nature of the data, there was no way to identify demographics or personal characteristics of each person posting. Second, purposive sampling is mainly used when there are too many cases to analyze. In our work, by applying the inclusion and exclusion criteria (described above) a census was taken.

Analysis

Thematic analysis was chosen as the analysis method for this study because it is a malleable method, allowing for easy use of additional theory such as Social Network theory. In addition, the nature of thematic analysis allows for easy comparison across cases that align with the research aim.[44] In order to identify themes or patterns, the Principal Investigator (PI) read through segments of text that were identified by codes and compared them for similarities and differences. Sections of text that had "rich, thick description" were emphasized.[41]

A codebook was created using both deductive and inductive codes. Deductive codes included informational support, emotional support, instrumental support, and appraisal support. For example, the code *emotional support* was defined in the codebook

as, "disclosure of concern, empathy, care, love, and trust via physical or psychological care."[5] An example that was coded as *emotional support* is, "Best of luck, and be careful."

Inductive codes were identified during the coding process. To do this, three threads were initially chosen. The PI read each thread in order to identify preliminary codes. She then re-read each thread to further develop and define each of the codes that were initially identified.[45] An example of a inductive code that emerged was, *access to naloxone or Narcan*. The practice of developing detailed definitions helped in the precise use of codes when applied to the rest of the forums. Data analysis was conducted using NVivo software.[45]

Ethics

The PI received her Collaborative Institutional Training Initiative certification from Emory University, where she learned about ethics related to conducting research. This study was submitted to Emory University's Institutional Review Board, IRB, on 4/25/17 and was documented as exempt on 6/26/17.

All documents related to this study were kept on the PI's personal laptop. The PI's personal laptop is password protected and was kept on her person when it was not locked in her apartment. All threads were de-identified prior to analysis. De-identification included, but was not limited to references to names, places or other identifiers. The PI chose random pseudonyms to replace the usernames that were used to post on the discussion boards to protect the anonymity of the user. All identifiable material will be destroyed by, December 2021.

Considerable care for confidentiality was taken into consideration when formulating the final report. Direct quotes are specifically important because a direct quote could be entered into a search engine's query and then located.[46] Eysenbach et al. discuss the concerns of using direct quotes in the analysis of discussion boards.[46] They observe that verbatim quotes are a hallmark of qualitative analysis and improves transparency but great consideration needs to be taken when determining if the individuals' posting intended for their material to be accessed by the general population.[5] After taking this into consideration, direct quotes will be used as that is what previous work has chosen to do.[9,12-15,47]

CHAPTER 4: RESULTS

Analysis of the discussion boards showed that all four types of social support were present: informational, emotional, instrumental and appraisal. Posts from all over the United States as well as Canada, the United Kingdom, and Australia were found.

Informational Support

Informational support is defined as, "communicating advice, information, and directives that a person can use to address personal or environmental problems."[5] This was the most prevalent theme throughout the discussion boards. During the analysis phase, multiple subthemes of informational support emerged. The first was *overdose prevention*, the second was *mechanism of how an overdose occurs*, and the last was *responding to an overdose*.

Overdose Prevention

The theme of overdose prevention, which comprised the majority of informational support, can be further broken into presence of fentanyl and carfentanil use, drug potency, mixing drugs, and using drugs unaccompanied.

Presence of Fentanyl and Carfentanil

The theme of the presence of fentanyl and carfentanil emerged in posts where "users" (those reading or posting on the discussion board) warned other users about fentanyl-laced heroin. Various types of information were included including a physical description of the heroin.

"I'm from [county name] county [state] where carfentanyl first showed up last

year.

The media put out warnings and photos of the stuff saying it was a mix of yellow

and orange."

In almost all of the posts, the locations of where the laced heroin was found were given.

"There's some fentanyl-spiked heroin making it's way around [city] and [city]

areas."

"There have been numerous deaths in the northeast [state] area from Heroin

laced with Fentanyl."

"Good Grief in [city] or [city] Canada it [overdoses] happens a few times a day

as CarFentanyl is so affordable and so powerful its being mixed into everything."

In order to share information about the locations of laced heroin, multiple users shared

news articles that sometimes included posting a direct link.

"Carfentanil-Ladened Heroin Found in Strathcona County, Alberta. Alberta

RCMP [Royal Canadian Mounted Police] are warning users of street drugs of

heroin contaminated with potentially deadly carfentanil found in Strathcona

County. Heroin seized as part of an ongoing drug investigation beginning in

October 2016 was sent to Health Canada where an analysis revealed the heroin

samples were actually laced with carfentanil. Carfentanil - designed for use in

large animals - has been linked to at least 15 deaths in Alberta in 2016. A dose as

small as 20 micrograms could be fatal. [link to source]"

In addition, people also identified the location of carfentanil based on personal

experience.

"I don't live there but seen this because my cousin is one of them. In [state] a bug [big] batch of fentanyl laced [heroin] is going around. More over doses are being reported. It's apparently in a white bag with a scorpion on it. [link to source]"

These quotations demonstrate the extent and detail of the informational support shared between users regarding the presence of fentanyl and carfentanil laced heroin, in order to help others avoid an overdose.

Drug Potency

The theme of drug potency emerged from discussion boards when users were conversing about the strength, quality or volume of a drug. Similar to the theme of presence of fentanyl and carfentanil, one user posted a newspaper article citing the purity of available heroin in order to warn others of the potential hazard.

"Four Die of Heroin Overdose in Seattle Aurora Area. Seattle police are warning heroin users about dangerous purity levels after several recent overdoses. Police spokesman Sgt. Sean Whitcomb says three people died and a fourth was taken to Harborview Medical Center for treatment. The Seattle Times Reports bicycle officers were canvassing the Aurora Avenue North corridor Saturday to warn users of the danger. Whitcomb says the working theory is that all of the victims bought heroin from the same person, given the timing and geographic proximity of the overdoses. Whitcomb says people need to remember that they can call 911 to report an overdose without fear of prosecution under the state's good Samaritan law. [link to source]"

In other posts, users encouraged others to be mindful of the volume of opioids they ingest in order to avoid an overdose.

> *"One thing I will advise and that is to start small, it's still enjoyable, and work up from there."*

> *"If you choose to be irresponsible, [I would] suggest a third of the dose you usually take of each substance."*

> *"If you have leftover dope from yesterday, be aware it may be stronger than expected."*

These quotes show that users want to share information related to mindfulness of the strength, quality and volume of opioids users may consume in order to avoid an overdose.

Combining Multiple Drugs

The theme of combining multiple drugs commonly emerged on discussion boards regarding ingesting two or more illicit drugs and/or combining an illicit drug with and prescription drug. Many of these posts included information on mixing heroin and cocaine in order to produce a "speedball." One user explained how a speedball can cause an overdose.

> *"There are myths that since you are doing an upper and a downer that they 'cancel each other out,' like the stimulant counteracting the CNS [central nervous system] depression for example, and that the health consequences are minimized. This is just factually not true. The most common danger is, as @Mackenzie described above, from the cocaine wearing off and CNS depression from the heroin causing breathing to retard or stop."*

There were multiple posts about the proportions of heroin to cocaine used in a speedball and how those proportions are important to consider in order to avoid an overdose.

> *"Take a hit of cocaine with a little heroin, not a hit of heroin with a little coke. Ratio is important both for safety and enjoyment purposes."*

> *"But I have to disagree with you about using more coke than heroin. I do get you point about heroin 'outliving' cocaine and thus having potential for overdose, but I think it may be more of an individual thing."*

In addition to injecting multiple illicit drugs, there were extensive discussions of mixing prescription opioids with other prescription drugs such as Xanax and Clonazepam which are both benzodiazepines ("depressants that produce sedation, induce sleep, relieve anxiety and muscle spasms, and prevent seizures").[48] This discussion mirrored the above, centering on users attempting to help others to determine safe levels of opioids to mix together and other prescription drugs in order to avoid overdosing. In several posts, users share their personal 'formulas.'

> *"I think 180 mgs of DHC [Dihydrocodeine] is acceptable, but 6 mgs of xanax is unnecessary."*

> *"Whenever I do mix them, I take 40 mgs oxy and 2 mgs clonazepam...that's as safe as it can get."*

Comparing these quotes to the ones discussing speedballs, these are more technical because they describe specific dosages since they medically prescribed medications.

Using Drugs Unaccompanied

The theme of using drugs unaccompanied emerged across discussion boards. The majority of posts centered around one harm reduction technique that attempted to address the danger of using drugs unaccompanied.

"It's obviously much, much better to use with friends. But, for whatever reason, that doesn't always happen for everyone. If you must be alone, it may help to alert a friend to what you're doing via phone, ensuring they know you're address [to] help."

Different users posted their reaction to this suggested harm reduction technique in order to accommodate different preferences.

"Speaker phone works well with a lot of things particularly since two people can talk throughout the process."

"Using FaceTime you would be able to watch the other person use and see how they are doing."

This discussion reveals creative applications of harm reduction techniques that seek to reduce overdose deaths while still being sensitive to people's preferences.

Mechanism of How an Overdose Occurs

The second subtheme that emerged from the discussion boards was *mechanism of how an overdose occurs* and what goes on inside the body during an overdose.

"Heroin overdoses kill through apnea and fatal hypoxia. Heroin has an effect that causes the respiratory center in your brain to depress. This effect is known as apnea. Apnea defined is- Suspension of breathing."

"Carfentanil is metabolized by the body much slower than other opioids meaning that if someone is revived they can leave the hospital and overdose again! [link to article]"

These posts share technical informational support that inform users about what is going on but do not aim to change how users behave, unlike the previous theme of overdose prevention.

Responding to an Overdose

The third subtheme of informational support that emerged from the discussion boards was responding to an overdose. This subtheme could be further broken down into access to naloxone and Narcan.

Responding to an overdose was one of the most detailed discussions because users laid out step-by-step instructions, including actions to take if someone witnesses an overdose.

"Slightly tilt their head back, pinch their nose shut with one hand and open their mouth with the other hand. You then take a good breath place your open mouth over their mouth and blow your breath into them. Watch their chest rise as you blow, then sit back and watch them exhale. This is called a rescue breath."

"There's a thing in first aid called the ABC's. It's an abbreviation of Airways, Breathing and Circulation. The 'A' is all important in the above scenario as there could be vomit in the person's mouth or throat, their tongue could be swollen or they may have something in their mouth obstructing their airway ... (B for Breathing), then whilst right up close you've gotta peer into their mouth to

visually look at the back of their [throat]. If there's something in there, tip them on their side and away from you then use your fingers to scoop is out before you check again. Do not use blind sweeps, but watch what you're doing so that you don't force the thing down their throat ...."

Information was also shared about how to protect oneself while trying to help someone who is overdosing.

"A face mask with a one-way valve is ideal, such as a pocket rescue breathing mask or ventilator mask, but a layer or two of fabric (a t-shirt, towel, a few layers of bed sheet or whathaveyou) is better than nothing. If nothing appropriate is available (which is unlikely if either of you are clothed) you can make a rough 'O' with your thumb and index finger of the hand which is holding their jaw open and place that over their mouth to blow through."

"Scan the area to make sure that there's nothing which could harm you or the patient such as heavy things which could fall, uncapped needles, broken glass, blood, people who could complicate the situation you'll want to give the person you're assisting your full attention so manage those risks before you approach them as much as possible in a timely manner."

Lastly, information was also shared on how to handle calling 9-1-1.

*"If you need to call for EMS (911) tell the operator that your friend collapsed and is unconscious. Other than that, don't say s*** ... If the emergency service operator has any reason to believe that that drugs are involved, the cops are likely to turn up and then the party's over. If you tell them that your friend has collapsed, that they're unconscious and that no drugs were involved then they'll*

> *send someone equipped to deal with anything which could lead to an unconscious*
>
> *person, including an overdose to just about anything known to medical science."*

One post summed up many of the themes that emerged from informational support and also pointed to the emotional ties between users:

> *"Be careful out there please. Try to not use alone. Have plenty of narcan around, this stuff takes multiple doses to bring people back and please don't be scared to call 911 on a friend in need, most places have a GOOD SAMARITAN law and the police won't bother u."*

Access to Naloxone and Narcan

The theme of access to naloxone and Narcan were evident throughout the discussion boards when users were discussing responding to an overdose. The conversation primarily emphasized the importance of having naloxone or Narcan and using it.

> *"ALWAYS have Narcan/ naloxone with you when using."*
>
> *"Have plenty of narcan around, this stuff takes multiple doses to bring people back."*

Conversations around naloxone and Narcan were not as detailed as others subthemes but rather portrayed the message that users should have it available whenever using opioids.

Emotional Support

Emotional support is defined as, "disclosure of concern, empathy, care, love and trust."[5] During analysis, the subthemes of safety, caring, and trust emerged. The

subthemes of safety and caring shared similarities because both were used at the end of a discussion post as a way of ending a post.

Safety

The theme of safety arose to mean avoiding injury or death. The following examples embodied that theme and were commonly used as a way a user would end a post.

"Stay safe everyone!"

"Just be safe out there brother."

"I hope you the very best of luck, and do work fast as this weekend temperatures are going down into the teens in our area of the Northeast!"

Caring

The theme of caring was embodied in the feeling of concern between users. Below are examples of caring that were mainly used at the conclusion of a message

"Jesus Christ man … I hope yall heed the warnings.. Rip [name]."

"Best of luck, and be careful"

"It's a tough life, one we all deserve better of. Hug to you!"

"I don't know what to say other than, you only get one life, best to cherish it and be responsible."

There was one instance where these two subthemes overlapped.

"Take care and stay safe."

Trust

The final subtheme of emotional support that emerged was trust. This was evident when users posted intimate details of their experiences with opioids and entrusted these intimate details with other users. Most of these were instances where the individual posting the experience was the one who had gone through the experience.

> "*The last overdose I had was this summer. I was driving back from copping from the Dboy [drug dealer] on 4+mg alprazolam (pressed S 90 3 green bars [Xanax], clearly contained more than 2mg alprazolam per bar and the green tint was way too bright to be pharmaceutical). I fixed a shot of 4-5 caps/tenths of [fentanyl]-laced heroin + 2 caps of highly pure cocaine and apparently I blacked out in the car and since I didn't have a seatbelt on in this work-van my friend was driving I was curled up on the floor of the passenger's side, dying. I woke up to the ER staff yelling and asking me wtf I took, informing that they had "lost me" for ~3 minutes. I was more concerned about that massive amount of Narcan that had injected me with. I was freezing cold, nauseated beyond belief, shaking, and my whole body hurt like I had been ran over by a dump truck. I had to be escorted to the ER restroom so I could shit my brains out; the naloxone had certainly "unclogged" my bowels with the un-pleasantries of horrid diarrhea. As soon as I could get them to let me fucking leave, I had the same dude with the work van drive my dopesick [withdrawing] a** right back [to] another dopeman [drug dealer], because I was pissed he had thrown out my whole stash.*

Additionally, there were also users sharing another person's experience with opioids. Most of the times this was in circumstances where the person who was using the opioids had passed away.

> *"My dad and I showed up at my brother's townhouse after a terrifying phonecall from his fiancee where, after only hearing her heart wrenching sobs, already knew what to expect, at worst. I still held a trickle of hope. We entered and heard her call to us from the top floor and we ran up and saw my brother crumpled on the floor half in the hallway and half the linen closet. I placed my palm on his back and it was COLD. I tried to roll him onto his back but he was already in rigor mortis. My big brother of 42 years finally succumbed to his addiction. He had only just started back into full-blown multiple shots a day use 2 months earlier. He wasn't careless with how he shot. He knew to do a small hit first to see if he needed more after an overdose episode years before. He's been doing this shit for 20 years. He knew what to do and what not to do. My dad was in the hall with the fiancee and I went into the bathroom to see wtf all he did. I saw what I thought was a bag of coke and a spoon with dark cotton ball dried into the glaze and all the other dirty aspects of use in progress. He was pronounced dead on [date]"*

Instrumental Support

Instrumental support was defined as, "sharing aid or services that directly help a person in need."[5] In the segments of text where instrumental support was displayed, the

goal of the post was to prevent someone from dying as a result of an opioid overdose. The subthemes that emerged were skill-based knowledge and insider knowledge.

Skill-Based Knowledge

Skill-based knowledge arose in multiple ways. The first was explaining what to do if someone was overdosing. This post included making sure the person overdosing had a clear airway and tips for providing rescue breaths. The person posting the information also explained that although cardiopulmonary resuscitation (CPR) can be life-saving if no pulse can be felt, in their opinion it is important to not administer CPR unless trained.

> *"Most towns in the developed world have some kind of CPR training courses which can be attended cheap or for free. If you're in [country], hit me up."*

This forum member offered to provide information of where people located in that specific country could seek CPR training. This displayed instrumental support by providing those who reach out to either potentially train users or connect them with someone who can. The second example is from a user warning about batches of heroin. One user who frequently posted warning about fentanyl-laced heroin offered their services.

> *"If anyone in [state name] is interested in FREE OD [overdose] intervention trainings, please feel free to PM [Private Message] me. We will happily come to your location if our [city name] office is too far. If you are out of state, we are planning to offer online trainings so please still PM me and I will keep you updated on the details."*

Similarly to the previous example, both of these forum members seem to be offering professional instrumental support; one person has training in CPR and the second overdose intervention training.

<u>Insider Knowledge</u>

In the final example of instrumental support, one user offers their time to others. The idea of having someone on the phone or via FaceTime is proposed if someone can not inject heroin in the physical presence of others. The idea of having another person involved is a back-up plan to the ideal situation of having someone physically present in the situation that an overdose may occur. Users discussed the importance of having someone who knew about heroin and would be attuned to know the difference between nodding off and overdosing; this would prevent false calls to the paramedics.

> *"I'm happy to offer up my ear to heroin forum members who anticipate needing someone to stay on the phone as they IV [intravenous therapy] but have no other options. Contact me via direct message and I'll try to help."*

Unlike the first two examples, this person is offering their time as someone who is a part of the community; they have specialized information that those outside of the community may or may not have.

Appraisal Support

Appraisal support is defined as, "the transmission of information that is useful for self-evaluation purposes."[5] The subthemes that emerged were affirmations and feedback.

Affirmations

      There were positive affirmations shared between users generally regarding the information support that was posted.

      "Thank you, very well said and informative."

      "That's actually a really good idea!"

      "@Lindsey, your experiences provide so much insight- it's this kind of post that I hoped for when beginning a discussion about this combo [heroin and cocaine]."

Feedback

      Feedback also emerged across the discussion boards. The primary form of feedback between users was regarding how to avoid an overdose.

      "Best advice is to never take them together! Ever."

      "I can't suggest that any benzo is safe with an opiate though."

The appraisal support that was provided on the discussion boards was both positive and informative to users reading.

CHAPTER 5: DISCUSSION

This study was an exploratory qualitative analysis about displays of social support about overdoses on online discussion boards. Overall, we found extensive evidence of social support. Specifically, the majority of social support was shown through informational support.

Overview of Findings

We identified four categories of support as we coded the data collected from 143 individual posts on seven forums from two discussion boards. Informational Support was the most commonly identified form of social support found when users were communicating about opioid overdoses. This finding was substantiated in other literature analyzing social support on discussion boards. For example, Love et al., conducted a content analysis of online cancer support groups and found that informational support was the primary form of support being shared.[49] Similar to Love et al., studies analyzing social support on online discussion boards ranged in topics from cancer to anorexia; they also found informational support to be the most commonly shared, or tied to other forms of support.[37,47,50-53]

The primary themes that emerged from informational support were overdose prevention, mechanisms of how an overdose occurs, and responding to an overdose. The theme of *overdose prevention* had subthemes that included *presence of fentanyl and carfentanil*, *drug potency*, *combining multiple drugs*, and *using drugs unaccompanied*. These subthemes align with the Harm Reduction Coalition's "Opioid Overdose Basics: Risks & Prevention Strategies." The Harm Reduction Coalition reported that mixing

drugs, tolerance, quality, and using alone were four indicators that should be considered in order to avoid an opioid overdose.[23] The overlap of our subthemes and Health Reduction Coalition's recommendations supports a well-informed harm reduction focus on discussion boards.

The subtheme *mechanism of how an overdose occurs* contained technical information including the definition of "apnea." Comparing this finding to the existing literature was novel because of its use of technical language. In a qualitative study analyzing support groups for adolescents undergoing chemotherapy to treat cancer, by Elwell et al., the informational support found was based on personal experience. For instance, users were sharing food suggestions that they were able to eat and keep down during chemotherapy (that notoriously causes nausea.)[52] This informational support was closely based on personal experience; in contrast, personal support was not found relating to the mechanism of how an overdose occurs. One possibility is that many users have taken part in Overdose Education and Prevention Classes.

The subtheme *responding to an overdose* was very detailed; it had step-by-step directions on what to do if you are in or witness to this situation. In contrast, the depth of the conversation surrounding the theme of *access to naloxone and Narcan* was very limited. None of the conversations mentioned where these drugs could be accessed or how to use them. Instead, all were about "having it." It is possible this is due to increased access to naloxone among laypersons so there is no need to post it on the discussion board.[54] There have been multiple communities around the country training laypersons, specifically injection drug users and their families and friends, to administer naloxone, among other overdose prevention strategies. A few examples of this include the Opioid

Overdose and Naloxone Distribution program in Baltimore, MD, the Skills and

Knowledge on Overdose Prevention program in New York, NY, and a program overseen

by the Homeless Health Care Los Angeles Center for Harm Reduction in Los Angeles,

CA.[55-57]

Emotional Support emerged on discussion boards through themes of safety,

caring and trust. A literature search also revealed that emotional support was commonly

found on discussion boards.[11,12,37,47,52,53] The themes of *safety* and *caring* were consistent

throughout the discussion boards and were a common way that users would end their

post. In an article examining social support on online support groups for Huntington's

disease, Coulson et al. article provided examples of emotional support including "Big

hugs to you" and "You and your family are in my thoughts and prayers."[50] These quotes

indicated a similar theme of emotional support being used in these posts similar to the

closing statements used in e-mails and written letters.

Trust was revealed as users shared intimate details of their experience with opioid

overdoses. Brown et al. explored the self-management of buprenorphine on discussion

boards. In their analysis, the theme of trust materialized differently than in our findings.

The Brown et al. study found that users were trusting the advice shared by others on the

discussion board over that of medical professionals.[49] This indicates that users of

discussion boards may have high levels of trust in one another about the information

shared, which is a potentially important role discussion boards play in users' internalizing

information about opioid overdoses. In contrast to the Brown et al. study the specific

concept of trust of medical professionals was not explored in our study. Instead the

concept of trust was revealed through users trusting one another with their personal

stories related to overdoses. The exploration of trust in greater depth is likely to be important to explore because previous literature has found distrust between medical professionals and people who inject drugs.[58]

Instrumental Support was provided on discussion boards through the themes of skill-based knowledge and insider knowledge. *Skill-based knowledge* centered around someone sharing a particular expertise. In one example, someone offered to share overdose prevention training, which is a specialized skill. Insider knowledge occurs when someone has familiarity on a certain topic because of their status within the community and is willing to share it. One user volunteered to be on the phone with another user if they had no choice but to inject alone, in order to avoid an overdose. This person with specialized knowledge would be able to separate the difference between "nodding off" and overdosing; this skill set and willingness to share it is unlikely to be available in the general community.

Coursaris et al. suggested that instrumental support was not expected to materialize on discussion boards, since the definition includes "tangible service."[59] Although findings of instrumental support were unexpected in the current study, we were able to provide evidence of instrumental support in a virtual space by users helping those in need. Additionally and consistent with our study, Sherman et al. found evidence of teen mothers communicating instrumental support outside of the general discussion board through private messages.[47] In an age where the internet is so widely used, it is important to consider how instrumental support may be provided in online settings. In summary, although the definition generally refers to giving money, labor, or time in our digital world, our work indicates that instrumental support can also be given on virtual spaces.

Appraisal Support was evident based on the themes of affirmations and feedback. In an article analyzing an HIV intervention, INSPIRE, Gwin et al. found appraisal support was evident on discussion boards and resulted in users reflecting on their beliefs about HIV and potentially changing them.[60] Similarly, on the discussion boards we analyzed, the feedback encouraged users to reflect on their own beliefs about, for example, the use and safety of mixing drugs. The methods used in our study did not allow us to determine whether users did or did not take the feedback given.

Limitations and Strengths

As with any research, we have identified limitations to this study. The first is that there were no demographics available for users posting to the discussion boards. We did not build in a methodology that would allow us to access the demographics of the study population such as gender, race, age, location and current or former drug use. Without understanding who the users of discussion boards were, conclusions about who is sending and receiving social support and whether users act on advice given is limited. Future research should include reaching out to those posting on discussion boards to gather demographic data. This information would allow researchers to have a better understanding of the people who post on discussion boards, and whether the kinds of social support provided varied by the demographic characteristics of users posting or receiving.

A second limitation is that the size (and therefore potential impact) of the readership of the discussion boards is unknown. We gathered information on the number of people posting on the discussions boards, but it cannot be determined how many

people are visiting the discussion boards and reading this information but not posting responses. It is possible that people who are reading the discussion boards could be influenced by the social support provided in the posts. Thus, we do not know the extent to which social support shared on discussion is spread. This could be particularly important when considering which, if any, interventions (such as posting accurate harm reduction techniques) on discussion boards are efficacious.

The third limitation of the study was that only one person deduced themes and coded the data which was a threat to the interpretive validity of the findings as indicated by Maxwell.[61] This was due to lack of time and funds. Having one person identify themes may have limited the variety and depth of themes identified within each form of social support.

The final limitation is that the findings are not generalizable. This study was qualitative and exploratory in nature. This is important because the findings from this study cannot be applied to other discussion boards outside of those explored. However, the data provided herein can form a springboard for future studies.

Our analysis had several strengths, in particular this study was the first of its kind in the field of opioid use. It adds to the literature because it is the first study to examine social support on non-professional discussion boards discussing opioid overdoses.

A second strength of this study was that a census was used to collect data. As a result, we were able to analyze all of the posts that fit our inclusion and exclusion criteria. This allowed for the most thorough understanding of the resulting posts.

Finally, this study was guided by theory. This was a strength for multiple reasons including it helped to contextualize the finds of different types of support and explain the importance of these findings.

Implications and Future Research

Evidence from this exploratory study indicates that further research in this area is worthwhile and feasible. Future research should specifically assess the accuracy of the (medical) information being shared. If accurate information is being shared, then discussion boards could be explored as a place where professionals could share additional information about harm reduction related to opioid overdoses. In contrast, if inaccurate information is being shared, public health professionals may consider intervening with accurate information as a way to try to mitigate the opioid crisis.

Future research could consider the role of online communities for people engaging in highly stigmatized behaviors. These communities could be a way for people to interact with others who are also engaging in the same behavior, and thus decreasing isolation. Additionally, because of increasing access to the internet, people can now retrieve information from wherever they may be. This could be especially helpful for people living in rural communities or those not living near harm reduction centers.

Future research studies should be designed to reach out to users regarding demographic data for those who interact with discussion boards. Although this would be challenging to accomplish, it is likely to be important, since it is likely that those who interact with discussion boards come from different levels of affluence, race, geography,

etc. Demographic information would aid public health professionals regarding who could be targeted with specific types of interventions.

Conclusion

Based on this analysis, there is evidence that informational, emotional, instrumental and appraisal support is being communicated through interactions on online opioid overdose discussion boards. Informational support is shared most frequently, but all other forms of support are present. These results suggest the feasibility of conducting research relevant to the opioid epidemic through publicly-accessed online discussion boards. This research could go on to inform public health interventions including those related to helping those dealing with an opioid addiction or public health professionals posting accurate information on discussion boards.

REFERENCES

1.   Commonly Abused Drugs Charts. 2015; https://www.drugabuse.gov/drugs-abuse/commonly-abused-drugs-charts, 2017.

2.   Rosenblum A, Marsch LA, Joseph H, Portenoy RK. Opioids and the treatment of chronic pain: controversies, current status, and future directions. *Exp Clin Psychopharmacol.* 2008;16(5):405-416.

3.   Volkow ND. *Prescription Drug Abuse.* NIH;2014.

4.   Population, total. World Bank; 2018. https://data.worldbank.org/indicator/SP.POP.TOTL.

5.   Glanz K, Rimer B, K V. Health Behavior and Health Education. San Francisco, CA: Jossey-Bass; 2008.

6.   Cobb S. Social Support as a Moderator of Life Stress. *Psychosomatic Medicine.* 1976;38(5):300-314.

7.   Leahy-Warren P. Social Support Theory. *Theories Guiding Nursing Research and Practice Making Nursing Knowledge Development Explicit*: Springer Publishing Company; 2014:85-101.

8.   discussion board. (n.d.). Dictionary.com Unabridged. Retrieved April 3, 2018 from Dictionary.com website http://www.dictionary.com/browse/discussion--board.

9.   Niederkrotenthaler T, Gould M, Sonneck G, Stack S, Till B. Predictors of psychological improvement on non-professional suicide message boards: content analysis. *Psychol Med.* 2016;46(16):3429-3442.

10. Rodham K, Gavin J, Miles M. I Hear, I Listen and I Care: A Qualitaive Investigation into the Function of a Self-Harm Message Board. *Suicide and Life-Threatening Behavior.* 2007;37(4):422-430.

11. Mulveen R, Hepworth J. An interpretative phenomenological analysis of participation in a pro-anorexia internet site and its relationship with disordered eating. *J Health Psychol.* 2006;11(2):283-296.

12. Messina ES, Iwasaki Y. Internet use and self-injurious behaviors among adolescents and young adults: an interdisciplinary literature review and implications for health professionals. *Cyberpsychol Behav Soc Netw.* 2011;14(3):161-168.

13. Brow LK. Online Self-Injurt Message Boards: The Role of Social Support for Young Adults: a Dissertation. 2015, San Francisco, CA.

14. Eichenberg C. Internet message boards for suicidal people: a typology of users. *Cyberpsychol Behav.* 2008;11(1):107-113.

15. Brown SE, Altice FL. Self-management of buprenorphine/naloxone among online discussion board users. *Subst Use Misuse.* 2014;49(8):1017-1024.

16. Rudd R, Aleshire N, Zibbell J, Gladden R. Increases in Drug and Opioid Overdose Deaths- United States, 2000-2014. *Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report.* 2016:1378-1382.

17. Cheatle MD. Perscription Opioid Misuse, Abuse, Morbidity, and Mortality: Balancing Effective Pain Management and Safety. *Pain Medicine.* 2015;16:S3-S8.

18. Melzack R. The Tragedy of Needless Pain. *Scientific American.* 1990;262(2):27-33.

19. *Timeline of Selected FDA Activities & Significant Events Addressing Opioid Misuse & Abuse.* US Food and Drug Administration 2017.

20. Centers for Disease Control and Prevention. Vital Signs: Today's Heroin Epidemic – More People at Risk MDAM. *Today's Heroin Epidemic – More People at Risk, Multiple Drugs Abused.* 2015.

21. Rudd R, Seth P, David F, Scholl L. *Increases in Drug and Opioid-Involved Overdose Deaths — United States, 2010–2015.* 2016.

22. Darke S, Zador D. Fatal heroin 'overdose': a review. *Addiction.* 1996;91(12):1765-1772.

23. Opioid Overdose Basics. http://harmreduction.org/issues/overdose-prevention/overview/overdose-basics/. Accessed 3/24, 2018.

24. Cassell J. The Contribution of the Social Environment to Host Resistance *American Journal of Epidemiology.* 1976;104(2):107-123.

25. Cohen S, Wills T. Stress, Social Support and the Buffering Hypothesis. *Psychological Bulletin.* 1985;98(2):310-357.

26. Tracy K, Wallace S. Benefits of Peer Support Groups in the Treatment of Addiction. *Substance Abuse and Rehabilitation.* 2016(7):143-154.

27. White WH. *Peer-based addiction recovery support: HIstory, theory, practce and scientific evaluation.* Chicago, IL: Great Lakes Addiction Technology Transfer Center, Philadelphia Departement of Behavioral Health & Mental Retardation Services 2009.

28.   Pantridge C, Charles V, DeHart D, et al. A Qualitative Study of the Role of Peer Support Speacilists in Substance Use Disorder Treatment: Examining the Types of Support Provided. *Alcoholism Treatment Quarterly.* 2016;34(3):337-353.

29.   Bassuk E, Hanson J, Greene R, Richard M, Laudet A. Peer-Delivered Recovery Support Services for Addiction in the United States: A Systematic Review. *Journal of Substance Abuse Treatment* 2016;63:1-9.

30.   Bryant A, Schulenberg J, O'Malley P, Bachman J, Johnston L. How Academic Achievement, Attitudes, and Behaviors Relate to the Course of Substance Use During Adolescence: A 6-Year, Multiwave National Longitudinal Study. *Journal of Research on Adolescence* 2003;13(3):361-397.

31.   Svensson R. Risk factors for different dimensions of adolescent drug use. . *Journal of Child and Adolescent Substance Abuse* 2000;9(3):67-90.

32.   Godley M, Kahn J, Dennis M, Godley S, Funk R. The stability and impact of environmental factors on substance use and problems after adolescent outpatient treatment for cannabis abuse or dependence. . *Psychology of Addictive Behaviors.* 2005;19(1):62-70.

33.   Korda H, Itani Z. Harnessing social media for health promotion and behavior change. *Health Promot Pract.* 2013;14(1):15-23.

34.   FAQ's-Fentanyl and Fentanyl-Related Substances. https://www.dea.gov/druginfo/fentanyl-faq.shtml.

35.   Alfonso F. How a Reddit forum has become a lifeline to opioid addicts in the US 2017; https://www.theguardian.com/society/2017/jul/19/opioid-addiction-reddit-fentanyl-appalachia.

36.   Hudson JI, Hiripi, Eva, Pope, Harrison G Jr, Kessler, Ronald C. The Prevalence
       and Correlates of Eating Disorders in the National Comorbidity Survey
       Replication 2008. Located at: Biol Psychiatry.

37.   Tong S, Heinemann-Lafave D, Jeon J, Kolodziej-Smith R, Warshay N. The use of
       pro-ana blogs for online social support. *Eat Disord.* 2013;21(5):408-422.

38.   Wooldridge T, Mok C, Chiu S. Content analysis of male participation in pro-
       eating disorder web sites. *Eat Disord.* 2014;22(2):97-110.

39.   Baumann BM, Mazzarelli A, Brunner J, Chansky ME, Thompson N, Boudreaux
       ED. Purchase and use patterns of heroin users at an inner-city emergency
       department. *J Emerg Med.* 2012;42(1):93-98.

40.   Salazar L, Crosby R, DiClemente R. *Research Methods in Health Promotion.* San
       Francisco, California John Wiley & Sons Inc. ; 2015.

41.   Hennink M, Hutter I, Bailey A. *Qualitative Research Methods.* 2011.

42.   Green TC, Grau LE, Carver HW, Kinzly M, Heimer R. Epidemiologic trends and
       geographic patterns of fatal opioid intoxications in Connecticut, USA: 1997-2007.
       Drug Alcohol Depend. 2011;115(3):221-228.

43.   Deursen A, Dijk J. Using the Internet- Skill related problems. *Interacting with
       Computers.* 2009:1-10.

44.   Braun V, Clarke V. Using Thematic Analysis in Psychology. *Qualitative
       Research in Psychology.* 2006;3(2):77-101.

45.   NVivo qualitative data analysis Software; QSR International Pty Ltd. Version 11.

46.   Eysenbach G, Till J. Ethical issues in qualitative research on internet
       communities. *BMJ.* 2001;323:1103-1105.

47. Sherman LE, Greenfield PM. Forging friendship, soliciting support: A mixed-method examination of message boards for pregnant teens and teen mothers. *Computers in Human Behavior.* 2013;29(1):75-85.

48. *Drug Fact Sheet: Benzodiazepines.* Drug Enforcement Administration.

49. Love B, Crook B, Thompson CM, et al. Exploring Psychosocial Support Online: A Content Analysis of Messages in an Adolescent and Young Adult Cancer Community. *Cyberpsychology, Behavior, and Social Networking.* 2012;15(10).

50. Coulson NS, Buchanan H, Aubeeluck A. Social support in cyberspace: a content analysis of communication within a Huntington's disease online support group. *Patient Educ Couns.* 2007;68(2):173-178.

51. Melecki C, Demaray M. What Type of Support Do They Need? Investigating Student Adjustment as Related to Emotional, Informational, Appraisal, and Instrumental Support. *School Psychology Quarterly.* 2003;18(3):231-252.

52. Elwell L, Grogan S, Coulson N. Adolescents living with cancer: the role of computer-mediated support groups. *J Health Psychol.* 2011;16(2):236-248.

53. Meier A, Lyons EJ, Frydman G, Forlenza M, Rimer BK. How cancer survivors provide support on cancer-related Internet mailing lists. *J Med Internet Res.* 2007;9(2):e12.

54. *Medications to Treat Opioid Addiction.* National Institute on Drug Abuse (NIDA);2018.

55. Wagner K, Valente T, Casanova M, et al. Evaluation of an overdose prevention and response training programme for injection drug users in the Skid Row area of Los Angeles, CA. *nternational Journal of Drug Policy.* 2010;2(3):186-193.

56.   Lewis D, Park J, Vail L, Sine M, Welsh C, Sherman S. Evaluation of the
        Overdose Education and Naloxone Distribution Program of the Baltimore Student
        Harm Reduction Coalition. . *American Journal of Public Health.*
        2016;106(7):1243-1246.

57.   Piper T, Stancliff S, Rudenstine S, et al. Evaluation of a Naloxone Distribution
        and Administration Program in New York City. *Substance Use & Misuse.*
        2008;43(7):858-870.

58.   Merrill J, Rhodes L, Deyo R, Marlatt A, Bradley K. Mutual Mistrust in the
        Medical Care of Drug Users The Keys to the ``Narc'' Cabinet. *Journal of General
        Internal Medicine.* 2002;17:327-333.

59.   Coursaris C, Liu M. An analysis of social support exchanges in online HIV/AIDS
        self-help groups. *Computers in Human Behavior.* 2009;25(4):911-918.

60.   Mitchell S, Edwards L, Mackenzie S, et al. Participants' Descriptions of Social
        Support Within a Multisite Intervetion for HIV-Seropositive Injection Drug Users
        (INSPIRE). *Journal of Acquired Immune Deficiency Syndromes.* 2007;46:S55-
        S63.

61.   Maxwell JA. Understanding and Validity in Qualitative Research. *Harvard
        Educational Review.* 1992;62(3):279.

APPENDIX A: CODEBOOK

Appraisal Support			Revealed through the transmission of information that is useful for self-evaluation purposes. This information could be in the form of affirmations or feedback. Feedback that encourages an accurate assessment of a situation.
Emotional Support			Presented through the disclosure of concern, empathy, care, love, and trust. This can be shown through physical or psychological care.
Informational Support			Displayed by communicating advice, information, and directives that a person can use to address personal or environmental problems.
	Fentanyl/ Carfentanil		Information given between forum users on fentanyl or carfentanil including how to identify it and how to avoid it.

	Mechanism of an overdose		Information given between forum users on what happens in the body during an opioid overdose.
	Naloxone, Narcan		Information given between forum users on naloxone or Narcan including how to use it and where to gain access to it.
	Overdose prevention		Information given between forum users on how to prevent an overdose both for oneself and information that can be shared with others.
		Mixing substances	Information about 'safe or unsafe' dosages of mixing heroin and/or prescription opioids with other drugs or alcohol and/or the dangers.
		Quality/ Strength	Information shared between forum users on assessing the quality and/ or strength of heroin or prescription opioids or determining the appropriate strength to ingest.

		Tolerance	Information shared by forum users about their tolerance to heroin and prescription opioids.
		Using alone	Information shared by forum users about the dangers of using alone.
	Overdose symptoms		Information given by forum users on the symptoms of an overdose.
	Police, Medical Professionals		Information given by forum users regarding police, EMS, etc. regarding an opioid overdose.
	Response to an opioid overdose		Information given between forum users on what to do if in a situation where someone is overdosing.
	Withdraw prevention		Information given by forum users on how to avoid experiencing withdraw symptoms.
Instrumental Support			Exhibited by sharing aid or services that directly help a person in need. Examples of instrumental support include giving money, time or labor. The

			key factor for instrumental support is, hands-on help.
Miscellaneous			Text that could be important but does not fit into any of the other codes