EXPLORING HELP-SEEKING BEHAVIOR IN ONLINE HEALTH COMMUNITIES AMONG WOMEN WITH DOMESTIC VIOLENCE EXPERIENCES

by

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Abstract

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Background: Domestic violence (DV) is one of the most pressing women's health concerns globally. Previous literature shows that women tend to seek help from informal sources (i.e., close friends and family) rather than formal sources (i.e., legal and police). Owing to the increased time spent at home and worsened social isolation during the COVID-19 pandemic, more women experiencing DV visited online health communities (OHCs) to seek help due to their anonymity and timely responses. However, OHCs may circulate unverified risky, and unhealthy information to users. Despite the surge of literature examining information discussed in the DV population, it is still unclear what types of help women sought and received the most from OHCs. Without such knowledge, we cannot evaluate the usefulness of OHCs for women who would like to seek help in OHCs after a traumatic DV experience.

Purpose: The aims of this study were to 1) describe the types of help sought by the women with DV experiences in OHCs, 2) describe the type and pattern (i.e., communication style) of the advice given in the OHC to women with DV experiences and 3) explore whether the needs of women with DV experiences were matched with the help they received in OHCs.

Methods: This is an exploratory, descriptive study to explore help-seeking behaviors by women experiencing DV on the subreddit community r/domesticviolence from November 14, 2020,

through November 14, 2021. For our analysis, we included posts by adult women (i.e., aged 18 or above) experiencing DV who seek advice on DV relationships or dealing with DV-related issues. We excluded posts from non-abused women, women victims under 18, non-English posts, good news announcements, gratitude posts without any advice-seeking, and posts related to advertisements. Two nursing students used the codebook developed and verified by a domain expert. Aims 1 & 2 used manual annotation and thematic analysis and Aim 3 used computation text mining tool (i.e., Linguistic Inquiry Word Count) and non-parametric statistical analysis (i.e., t-test or Mann-Whitney U).

Results: Among 1,996 postings crawled, 250 postings were included after screening for women with DV experience. 68.8% sought information support, and 36% sought emotional support. DV (n = 43, 25%) and legal (n = 21, 12.2%) knowledge were the most frequent types of information help being sought. Based on initial postings, five themes emerged. 97.2% of the postings received information support, while 87.6% received emotional support. DV knowledge (n=414, 26.4%), DV shelter (n=242, 15.4%), and legal knowledge (n=190, 12.1%) were the most frequent types of information help received in OHC, while 68.6 % of postings received encouragement as emotional support. 29.6% offered networking help, and 78% offered experience sharing. Based on the comments, seven themes emerged. 80% of postings matched with the type of help requested, while 17 linguistic or postings features were found to be significantly different between the two groups (i.e., matched help and unmatched help).

Conclusions: OHC is a resourceful platform for help-seeking among women with DV experience. This study can guide the development of future algorithms to detect help-seeking behavior within OHCs effectively.

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Preface

Vivian Hui is supported by the O'Neil Center University of Pittsburgh Nursing Scholar 2019-2021 cohort, Academy of Violence and Abuse Scholar 2021 cohort, and awarded with Abraham A. Constantino Jr., MD. Endowed Scholarship, Enid Goldberg Scholarship, EduMed Graduate Scholarship, Rose Constantino Endowed Scholarship. This research was supported by the Margaret E. Wilkes Scholarship Fund Award. This dissertation research would not have been possible without the encouragement, support, and expertise from my dissertation chair, Dr. Young Ji Lee, and my committee members Dr. Rose Constantino, Dr. Heeyoung Lee, De. Jamie Zelazny, Dr. Judy Chang, and Prof. Daqing He. Through this research, I hope that I can honor the hours of hard work and assistance that all of these individuals have provided throughout this exciting, trying, and rewarding journey. I would also like to express my sincere gratitude toward my family and friends who have been instrumental in developing the woman, nurse, and scientist I have become today. Especially *Ernest Cheung*, who encouraged and empowered me to strive for excellence and dedicated many years of mentorship towards my career development, enlightened me to be the best version of myself. I could not be able to believe in myself and achieve my goals without the tremendous support from him over the past decade. Lastly, I would like to express my deepest gratitude to my mother, *Vesan Kung*, and brother, *Allen Hui*, who have nurtured me to overcome challenges bravely and supported my Ph.D. journey by taking care of themselves well in Hong Kong, thereby allowing me to continue pursuing my Ph.D. far away from home.

1.0 Proposal Introduction

1.1 Specific Aims

Domestic Violence (DV), defined as any forms of physical, sexual, psychological, and financial abuse against adult women (i.e., 18 years old or above) that occurred within a household/ an intimate relationship. It is a multidimensional phenomenon with consequences of severe social, emotional, and cognitive impairment (Flury & Nyberg, 2010). Compared to men and children, women are more frequently exposed to severe physical aggression, traumatic injuries, and mental illness (Kita et al., 2021; Jones et al., 2001). To handle the abusive relationship or environment, some women with DV experiences disclosed their situation and sought help from relatives in their families (Satyen et al., 2018; Parvin et al., 2016). The most common types of help sought by those women included speaking with someone about their DV situation, planning to escape from the situation, protecting children, couples counseling, and restraining orders (Satyen et al., 2018). Studies showed that disclosing intimate and abusive experiences with others can be beneficial to victims when they receive appropriate and supportive responses (Sylaska and Edwards, 2014; Pennebaker et al., 2001). Positive responses like emotional support and emotional validation are associated with enhanced self-worth and decreased psychological suffering (Orchowski & Gidyca, 2015; Orchowski et al., 2013).

Under the COVID-19 pandemic, women with DV experiences were forced to stay home with their abusers (Boserup et al., 2020; Bradbury-Jones & Isham, 2020). Since they could not seek help in person as they did before the pandemic, some of those women turned to the Internet and sought help (Emezue, 2020). A recent study found that these women expressed their concern and experience during the pandemic on online health communities (OHCs), including the service

disruption, preparation to leave, and factors increasing abuse or distress (Lyons & Brewer, 2021). Furthermore, women with DV experiences were reluctant to participate in face-to-face interactions or even survey studies due to feelings of stigmatization, shame, guilt, alienation, and judgment (Choo et al., 2015; Tarzia et al., 2017; Suler, 2004). With some degree of anonymity and timely response, OHCs have been proven as an interaction channel for people to seek information and support, identify their resources, and reach out to health services during the pandemic (Jong et al., 2021).

Although OHCs serve as a platform to seek help anonymously and offer abundant information and suggestions given by community members, it is too early to decide whether OHCs can provide the resources and suggestions that match what they sought among women with DV experiences. Since the quality of information and suggestions provided in OHCs are not monitored by healthcare professionals, women with DV experiences can be exposed to receiving harmful or misinformation. Evidence has shown that women with DV experiences are susceptible to re-traumatization and depression (Golding, 1999; Lewis et al., 2006). Therefore, receiving unfiltered information or inappropriate suggestions from OHCs users may cause them worsening emotional distress and victimization (Finn and Banach, 2000). Furthermore, information and suggestions shared by OHCs users may not be feasible or realistic to women with DV experiences, which may cause them to become discouraged and prevent them from seeking further help (Finn and Banach, 2000).

Despite the significant among of help-seeking being sought from OHCs, no study to date has examined what types of help women with DV experiences have sought and received from the OHCs members when they disclose their experiences to seek help. Studies showed that support from OHCs can positively affect people's health decision-making and mental health when users adopt and apply helpful suggestions that they received to their daily lives (Wicks & Frost, 2008;

Westbrook, 2007). However, some suggestions could have a deleterious effect on victims' help-seeking decisions. Thus, it is critical to examine several key questions related to women with DV experiences regarding the use of OHCs: 1) what types of help they sought in OHCs, 2) what types of help they received and 3) whether women received the type of help they sought from OHCs.

However, only a few studies have evaluated the help-seeking results among women with DV experiences in OHCs (Jiang et al., 2012; Jin et al., 2015; Li et al., 2016). Particularly, it is still uncertain whether health information technology has been developed for help-seeking in this vulnerable population. It is unclear whether women with DV experiences received the information and suggestions that they sought in OHCs. Understanding the help-seeking behavior and exploring their help-seeking result can guide future uses of OHCs for this vulnerable population and whether OHCs would be a useful resource when they seek help. Thus, the overarching goal is to examine the help-seeking behavior among women with DV experiences presented in OHCs. Our specific aims are:

Specific Aims:

Aim 1: To describe the types of help sought by the women with DV experiences in OHCs (based on initial postings).

Aim 2: To describe the type and pattern (i.e., communication style) of the advice given in the OHC to women with DV experiences (based on comments).

Aim 3: To examine whether the needs of women with DV experiences were matched with the help they received in OHCs.

OHCs are a platform for information and help-seeking for many individuals including women experiencing DV. Our work seeks to describe the current state of how women with DV seek help using OHCs, what type of help and suggestions are offered, and how women describe whether and how they use those OHC suggestions. This may shed light on the innovative strategies

for scientists to understand the usefulness of OHCs, and perhaps explore developing and applying intervention or developing algorithms to optimize the use of OHCs in help-seeking to mitigate the DV's harmful consequences in this vulnerable population.

1.2.1 Background and Significance

This dissertation focuses on women as victims with domestic violence (DV) experience aged 18 or above. DV referred to any form of abusive behavior in any relationship used by one partner to gain or maintain control over another intimate partner (Department of Justice, 2021). Previous research has considered DV as trauma and addressed the importance of help-seeking (i.e., how they seek help and the barriers to help-seeking) among women with DV experiences (Satyen, 2018). This chapter will discuss the concept of help-seeking among the DV population and explain the magnitude of the health burden. In addition to this, relevant DV research on online health communities (OHCs) will be discussed to explain the potential for women to seek help. This chapter is divided into three sections: 1. DV as a trauma; 2. DV and the role of help-seeking; 3. Research on OHCs in DV among women.

1.2.1.1 Domestic Violence as a trauma

Domestic Violence and Significance

DV is a global health issue that threatens the well-being of people around the world. According to the United States (U.S.) office on Violence against Women, DV includes an array of

abuse that could happen in a previous or current intimate relationship including physical abuse, sexual abuse, emotional abuse, financial abuse, and psychological abuse (Department of Justice, 2021). In the U.S., about twenty people experience intimate partner physical violence every minute, which adds up to 10 million abuse victims annually (Black et al., 2011). Moreover, DV has a considerable monetary impact in the U.S according to the Centers for Disease Control and Prevention (CDC), which estimates the annual cost of DV to be over 8 billion owing to increasing health expenses and decreasing productivity. The estimated cost per female experiencing DV is $103,767 (Fishman et al., 2010).

Compared to men, children, and the elderly, adult women are disproportionally exposed to a more severe traumatic experiences from DV, such as emotional distress, depression, anxiety, and post-traumatic stress disorder (PTSD) (Jones et al., 2001). Women who experienced physical aggression were more urgent to leave the situation than others, to protect their lives (Ansara and Hindin, 2010; Flicker et al., 2011). Most women who stayed in shelters for safe temporary housing usually were battered, suffered from limited social support, and had a relatively low income to support their living (Johnson & Zlotnick, 2009). Furthermore, women with DV experiences had multiple victimization experiences and more life-threatening aggressive experiences by their intimate partners (Kita et al., 2021). As childbearing was a responsibility for women to demonstrate feminine nurturing to their family, women were more prone to have guilt and shame for separating their child from their partner or other family members (Scheffer Lindgren et al., 2008).

1.2.1.2 DV and help-seeking

Help-seeking behaviors among women with DV experiences

Help-seeking is a dimension of coping that is defined as "the things that people do to avoid being harmed by life-strains" (Pearlin & Schooler, 1978, p.2). The help-seeking behavior is perceived as any action of seeking help from trusted people in the community and includes understanding, guidance, treatment, and general support when dealing with stressful experiences (Rickwood and Thomas, 2012). Women with DV experiences are seeking help to speak with someone about their circumstances, escape from the DV situation, protect their children, or attempt couple counseling (Satyen et al., 2018). These help-seeking behaviors among the population can expedite the decision-making process to rebuild their lives after the DV experience (Frías, 2013).

Abundant research has focused on what types of help women with DV experience sought through interviews and surveys. These women tend to seek informal help from their networks rather than other formal resources (i.e., legal, police, and healthcare services). Parvin et al. (2016) reported that only 21% of women with physical violence disclosed and 19% sought help. Among those women who sought help, 89% sought help from informal sources such as relatives from their own side, neighbors, and relatives from their partner's side. Similar results were found from studies in different cultural contexts among women with DV experiences (Johnson & Belenko, 2021; Paul, 2016; Muluneh et al., 2021).

An array of positive results has been reported after seeking help from informal networks by women survivors. For instance, with the positive feedback or responses given by informal networks from friends or family members, women survivors with DV experience were reported to have an improvement in overall quality of life (Goodkind et al., 2003), self-worth (Orchowski & Gidyca, 2015), self-esteem and mastery of one's life (Mitchell & Hodson, 1983), and intention to

leave the DV situation (Edwards et al., 2011; Edwards, Gidycz & Murphy, 2015). When informal sources of help are not helpful to solve the problem, then women seek formal help (Baker, 1997). Research demonstrates that receiving help from formal DV services such as aDVocacy, counseling, and children's services reduces the negative impact of DV (Bennett et al., 2004). Bennett and colleagues (2004) concluded that survivors who approached formal DV help (i.e., legal support, contacting police or counseling services) reported improved decision-making ability, self-efficacy, and coping skills after counseling. Folger & Wright (2013) echoed the results with reduced negative post-trauma outcomes and improved well-being.

Since women with DV experiences prefer to seek help from informal networks, disclosure has been regarded as one of the important ways of help-seeking. For example, disclosing DV victimization is highly associated with better mental health outcomes such as improved depressive symptoms, better emotional processing of the trauma, and better well-being (Pennebaker et al., 2001). This result aligned with the result from a review study conducted by Sylaska and Edwards (2014), which also found that victims experience positive social reactions like believing the victim's reports and validating the victim's experiences. The process of disclosure contributed to a significant reduction in suicidal ideation risk (Coker et al., 2002), alcoholism (Douglas & Hines, 2011), depressive symptoms, and post-traumatic stress disorder (Overstreet et al., 2019; Fortin et al., 2012).

Disclosing DV experiences to others does not always improve the mental health of victims. Depending on the quality and nature of responses that women receive after disclosure, some risks can stem from disclosure. For example, negative responses such as judgmental attitudes, survivor-blaming, and a lack of support are contributed to secondary victimization (Nagy 2016; Powell 2015; Thompson et al., 2016). Moreover, several studies have explored how secondary victimization catalyzed feelings of shame and guilt and impeded further disclosure or help-seeking

initiatives (Ahrens et al., 2007). Therefore, providing good feedback and responses to women with DV experience is important in facilitating the help-seeking process with a better health outcome.

However, with the COVID-19 pandemic, traditional formal ways to seek help among women with DV experience are limited. Additionally, this pandemic time has demonstrated the growing use and acceptance of alternate forms, forums, and processes of human communication, interaction, and connection in digital and technological spaces. The opportunities and utility of these resources are not likely to disappear even after the pandemic. Previous research reveals that victims are reluctant to seek help, and participate in face-to-face or even survey interactions due to feelings of stigmatization, shame, guilt, alienation, and judgment (Tarzia et al., 2017; choo et al., 2015; Suler, 2004).

Help-seeking in online health communities (OHCs)

During the COVID-19 pandemic, women with DV experience were forced to stay at home and were unable to seek help as they did before the pandemic (Boserup et al., 2020; Bradbury-Jones & Isham, 2020). A recent study found that these women turned to the Internet and expressed their concerns and experience during the pandemic lockdown on OHCs, a platform that can be considered one informal resource. These women discuss a variety of topics in the OHCs including service disruption, preparation to leave, and factors increasing abuse or distress during the pandemic (Lyons & Brewer, 2021).

Even before the COVID19 pandemic, as computer literacy and internet usage advanced exponentially, people started to seek healthcare information and support from peers through OHCs. A study conducted in the U.S. context revealed that 80% of internet users searched for health-related issues and 18% had sought support from peers with similar health conditions (Yan et al., 2015). This result showed patients can play a pivotal role to find resources, support, and guidance online as complementary information in addition to the information provided by

healthcare professionals to manage their illness condition (Yan et al., 2015). Another review study conducted by Smailhodzic et al. (2016) revealed that patients preferred to use OHCs because they feared that health care professionals filtered important information like clinical trials, and the latest research, and lacked empathy capability under acute clinical settings in hospitals. Patients found more rewarding benefits from online space with more valuable reviews on treatment side effects and active supporting networks.

Violence victimization experiences are socially stigmatized and often difficult to discuss due to the feelings of shame and guilt, and fear of not being believed (Carretta et al., 2016; Sable et al., 2006). Help-seeking in OHCs could remove the barriers and stigma from face-to-face help-seeking. The anonymity and disinhibited effect of OHCs allow women with DV experiences to disclose sensitive DV stories without shame (Tanis, 2008). The help-seeking behavior found in OHCs is mostly from DV survivors who felt they had nowhere else to turn (Moors & Webber, 2013) because they felt OHCs like a safe, anonymous, and highly accessible space for help-seeking. OHCs have provided a supportive online environment for DV victims and survivors to disclose and exchange support. Research indicates that engaging in OHCs facilitates help-seeking initiatives, including encouraging victims to reach out for services and support to deal with trauma experiences (Dworkin, 2018).

Similarly, a recent systematic review conducted by Gorissen et al. (2021) indicated that victims of sexual violence disclose their victimization online to seek support for clarification, validation, unburdening, seeking justice, informing others, and providing support, education, and serve as a form of activism. The online responses to sexual victimization are predominantly positive, while negative responses are relatively rare. Victims used the OHCs to enquire about their violence severity, share emotions, and seek encouragement, which was considered to complement the traditional health care delivery to facilitate victims to take their initiatives in

managing their health. Andalibi et al. (2016) also delineated that survivors of sexual abuses preferred to use an anonymous account to seek support directly, ranging from information, advice, opinions, and networks. With participation and interaction between OHC members in the online community, OHCs were used as a virtual help-seeking center for victims to identify available resources and validate their emotions through peer support (Andalibi et al., 2018; O'Neill, 2018). Therefore, OHCs have the potential to be a resource hub for victims and survivors to seek information and emotional support and gain relatable experiences among users with similar DV experiences.

1.2.1.3 Research on OHCs in DV

As studies illustrated, OHCs have substantial potential to facilitate help-seeking among victims and survivors of traumatic experiences. In the context of DV, researchers have also tried to measure and examined the usefulness of OHCs in a similar way. Hurley et al. (2007) analyzed postings published on a DV survivor's public online support group to understand how the online members created 'a new self' from the perspective of self-reflection. Members from the forum learned the experience of other users and reflected on their situation as to whether it is dangerous or not. Another relevant study conducted by Westbrook (2007) discussed the information exchanged among women with DV experiences on OHCs, including finance, law, mental health, logistics, and information. Their work highlighted sources of information that were discussed by

women and demonstrated that online support groups may be helpful resources for information on DV.

Lindgren (2014) and her team tried to understand the supportive dynamics of OHCs for abused women in Sweden. Her team differentiated two distinct networks in OHCs, takers and givers. Takers refer to online users who take the information and suggestions without contribution, while givers refer to online users who are dedicated to providing information and suggestions. The giver's group contributed the most to the forum; they facilitated communication, provided information and emotional support, as well as empowered members to take action in reporting DV. Lindgren viewed the online forum as a form of 'collective intelligence' through 'a community of practice' among members.

Apart from exploring the information exchange in OHCs, an array of studies developed models to identify DV postings or to improve DV screening on social media such as Facebook, Twitter, and Reddit (Subramani et al., 2017; Subramani et al., 2019; Schrading et al., 2015). Homan et al. (2020) explored the reasons why victims decided to leave or stay by analyzing the posts on Twitter. Subramani et al. (2018) discovered the themes related to DV on Twitter, while Liu et al. (2021) also explored the short-term outcomes of DV on individuals' mental health on Weibo. Furthermore, some studies leveraged automated methods such as topic modeling and sentiment analysis to analyze DV postings on OHCs written during the COVID-19 pandemic. For instance, Xue et al. (2020) analyzed the topics from Twitter through text mining techniques, while Usher et al. (2021) analyzed the sentiment in online postings from social media among the DV population during the pandemic in Australia. Also, Lyons and Brewer (2021) examined the experiences of abused women during lockdown from online postings through qualitative thematic analysis.

Potential risks of OHCs among women with DV experience

Despite the benefits generated by OHCs in the DV population, it is not a platform without risks and concerns. With the anonymous nature of OHCs, previous literature described several areas that may be problematic for women seeking help and support through OHCs such as misinformation and disinhibited behavior (i.e., survivor-blaming and threats) (Finn and Banach, 2000).

With the wealth of information on the Internet, people can easily find online information resources (i.e., websites, encyclopedias, YouTube, blogs, books) and then share them in OHCs. However, the content in online resources is not filtered and regulated by authorities. The potential risk of using OHCs would be the flood of misinformation shared among members without realizing those contents are not evidence-based or approved by certified health care professionals. The myths, misconceptions, misinterpretations, and rumors afloat related to COVID-19 regarding transmission, vaccine effectiveness, and lockdown are prevalent. This false information was circulated broadly via social media such as Reddit, and was referred to as an "infodemic" under pandemic. Women with DV experience are fragile and more vulnerable to misinformation since they believe they were in a helping or therapeutic context in OHCs. The growth of misinformation hinders the self-sufficiency of women and therefore increases the fear of infection and transmission (Depoux et al., 2020). Misunderstandings of the pandemic could change the social perceptions and attitudes toward their partner in the family, which could be a threat to women's life with more fierce arguments and fights after the DV experience.

Finn and Bannach (2000) stated that misinformation can be considered victimization when it is purposefully provided in the OHCs. For example, when a member in the OHCs posted a website with a link in their post, the website may first appear to be a helpful resource. After a few clicks of closer investigation, some unhealthy and misleading information pops up frequently such as hostile rhetoric, pornography, or ads containing sexual assault. This type of misinformation is

annoying and disturbing to women with emotional distress from DV experiences already, which potentially increases the odds of revictimization in this population.

Another threat of using OHCs among DV populations would be disinhibited behavior such as survivor-blaming and threats. Research has examined the disinhibited effect of online environments (Suler, 2004), where members can communicate online without social status clues such as age, race, body language, and facial expressions. This disinhibited environment breeds negative responses (i.e., inappropriate, or unsupportive) since members do not need to take responsibility for what they are suggesting and commenting on in the OHCs. One common negative response includes not being believed and being blamed. When women with DV experiences disclose their stories in every detail, other members in OHCs could judge their behavior or perception based on what they believed only. In this way, women with DV experiences could be exposed to threats, profanity, seduction, and personal attacks such as survivor-blaming (Whiting et al., 2019). Repeated exposure to blaming, stigmatizing, or minimizing the DV event in OHCs could increase self-blame, guilt, and hopelessness, which further inhibits the help-seeking motivation among women.

Research Gap

The use of OHCs has substantial potential to provide insight into help-seeking behaviors of DV victims and survivors in different DV situations and can serve as a complementary resource to educate survivors by providing a good resource. Currently, it is still uncertain whether any existing health information technology or any technology interventions had been applied to assist help-seeking in OHCs. Women with DV experience are disclosing their DV situations and stories to seek help in OHCs. However, they can be easily re-victimized or suffer from unverified and unreliable information. For example, women with DV experiences could suffer from severe emotional distress if the responses and suggestions in OHCs are negative and not helpful.

However, the current help-seeking research in the DV field examined general help-seeking behavior in the traditional context (i.e., formal sources and informal networks). Yet, there is no study to understand the types of helps that these women sought and received from the OHCs, and how the users establish the credibility of comments (i.e., present their advice convincingly) in the OHCs.

There is a dearth of research to examine the help-seeking behavior and information/ suggestions characteristics among victims and survivors in OHCs. Although women with DV experiences shared their stories and extensive information in OHCs such as Reddit (i.e., a public online forum for users to discuss and share information according to different topics), only one study on DV that was specific to men victims has been conducted to examine their help-seeking behavior within the OHC (Sivagurunathan et al., 2021). This thesis would like to fill this gap by adopting an exploratory approach to evaluate what types of help are sought and received and the information/advice pattern provided in OHCs among women with DV experience. Without such knowledge, we could not evaluate whether OHCs would be a useful resource for women with DV experience. The overarching goal of this dissertation is to examine the help-seeking behavior and information/suggestions pattern expressed in OHCs. The research aims were formulated as follows:

Aim 1: To describe the types of help sought by the women with DV experiences in OHCs (based on initial postings).

Aim 2: To describe the type and pattern (i.e., communication style) of the advice given in the OHC to women with DV experiences (based on comments).

Aim 3: To examine whether the needs of women with DV experiences were matched with the help they received in OHCs.

1.2.2 Significance

Due to the geographical, time constraints, and cultural limitations of traditional help-seeking pathways in hotline calling or DV agencies, victims could be more connected with other survivors through technology. OHCs have become an increasingly common form of resource to understand real-time experiences and challenges faced after a traumatic experience. (Lyons & Brewer, 2021)

Under the COVID-19 pandemic, research elicited that DV survivors leveraged OHCs to share their DV experience and seek help during quarantine (Lyons and Brewer, 2021; Usher et al., 2021; Xue et al., 2020). Traditionally, women with DV experience tend to seek help informally from friends or family networks. Research indicated that help-seeking from informal sources is beneficial to mental health, quality of life, self-worth, and mastery of one's life (Goodkind et al., 2003; Orchowski & Gidyca, 2015; Mitchell & Hodson, 1983) However, women with DV experiences who use OHCs to seek help can potentially be misled, critically judged, leading to re-traumatization due to the prevalence of misinformation or the effect of disinhibition in the online space (Suler, 2004; Pennebaker et al., 2001). It is possible that women with DV experience, who were restricted by childbearing and financial issues, are susceptible to the negative sequelae of DV with lifelong shadows that lingered. Therefore, understanding how DV survivors seek help and adopt the information/suggestions shared by others from the OHCs is imperative for victims, clinicians, and researchers. Furthermore, we can examine the potential of OHCs as a resource hub for this vulnerable population.

Traditional in-person interviews and surveys can be labor-intensive and time-consuming. Also, these vulnerable populations prefer to share their experience anonymously due to shame and stigma. OHCs can be an alternative approach for researchers and clinicians to understand their

concerns and needs, and translate them into meaningful and actionable interventions. This thesis would provide new insights into help-seeking among women with DV experiences and may guide future technology-based intervention when people are suffering from limited accessibility under quarantine or stay-home situations. This purposed study has the potential to develop a metric to explore the adoption of information/suggestions shared by women survivors on OHCs, thereby identifying potential victims who may suffer from secondary victimization in DV populations earlier and reducing the mortality and morbidity arising from DV.

1.2.3 Innovation

This is the first study to understand the help-seeking behavior of OHCs based on women with DV experiences. Although women are the majority of DV victims (Alhabib et al., 2010), previous help-seeking behaviors in OHCs had examined male victims only (Sivagurunathan et al., 2021). Moreover, OHCs have a potential risk to disseminate harmful and wrong information to this vulnerable population. This study is the first one that focused on understanding the types of help that these women sought and received from the OHCs. We believe that this study can provide the framework to extract help-seeking information in the DV population on OHCs and examine the possibilities to understand the help-seeking result through text mining techniques. Future studies can follow the approach from our study and leverage advanced computational methods to develop a tailored intervention for help-seeking initiatives.

1.2.4 Theoretical framework

Help-seeking is a dimension of coping that is defined as "the things that people do to avoid being harmed by life-strains" (Pearlin & Schooler, 1978, p.2). The help-seeking behavior is perceived as any action of seeking help from trusted people in the community and includes understanding, guidance, treatment, and general support when dealing with stressful experiences (Rickwood and Thomas, 2012). In this dissertation, a framework of help-seeking and change developed by Liang et al. (2005) will serve as a foundation theory to extract the help-seeking concepts from OHCs (See below Section 1.4.3.1). Liang et al. (2005) proposed a theory of help-seeking in three stages: (1) problem recognition and definition, (2) the decision to seek help, and (3) the selection of a help provider.

The first stage of problem recognition and definition is based on the degree of understanding of survivors of violence by comparing themselves with others. This stage allows the survivor to compare themselves with others on the severity of the abusive experience, whether it is serious enough to report (Haggerty and Goodman, 2003), or it is just a norm and perceived as their guilt with silence (Liang et al., 2005). This phase is influenced by socio-economic factors, such as social, cultural, and religious norms in the community. The traditional social stereotype in advocating DV as a private affair in a family, instead of a crime for which the perpetrator could be sentenced, can change the women's perceived recognition and definition of violence in help-seeking.

The second stage of the model is to identify the decision-making process to seek help. For example, Goodman et al., (2003) reported a positive correlation between the level of severities of violence experienced and help-seeking by DV survivors, which means the more severe of violence experienced, the higher the chance to seek help from others. Apart from the

severities of DV experience, Cauce et al., (2002) also reported survivors could seek help actively when they realize the situation cannot be solved on their own. However, women with children were reported to be unwilling to seek help or report abuse due to the fear of losing custody of their children or a loss of financial stability (Peckover, 2003).

The third stage is characterized by selecting their help formally and informally. After recognizing violence and deciding to seek help, women survivors are ready to choose which type of help they feel more comfortable asking. Broadhurst (2003) described the help selection process among women are based on cost-benefit analysis. Depending on the severity of the DV situation and encouragement from peers, women may consider the cost of death by remaining silent would be higher than the cost of seeking help formally and speaking up to the community (Liang et al., 2005).

As this theoretical framework was built in 2005 based on interviews and surveys, it does not fully reflect the help-seeking process and patterns of OHCs. Especially for the third stage, online users might not disclose whether they adopted the advice and sought help in reality after the help-seeking attempts in OHCs. Therefore, this dissertation study focuses on the process from stage one to stage two as marked in figure 1. This dissertation focused on how women with DV experience seek help in the virtual environment, especially types of help they sought and received on OHCs.

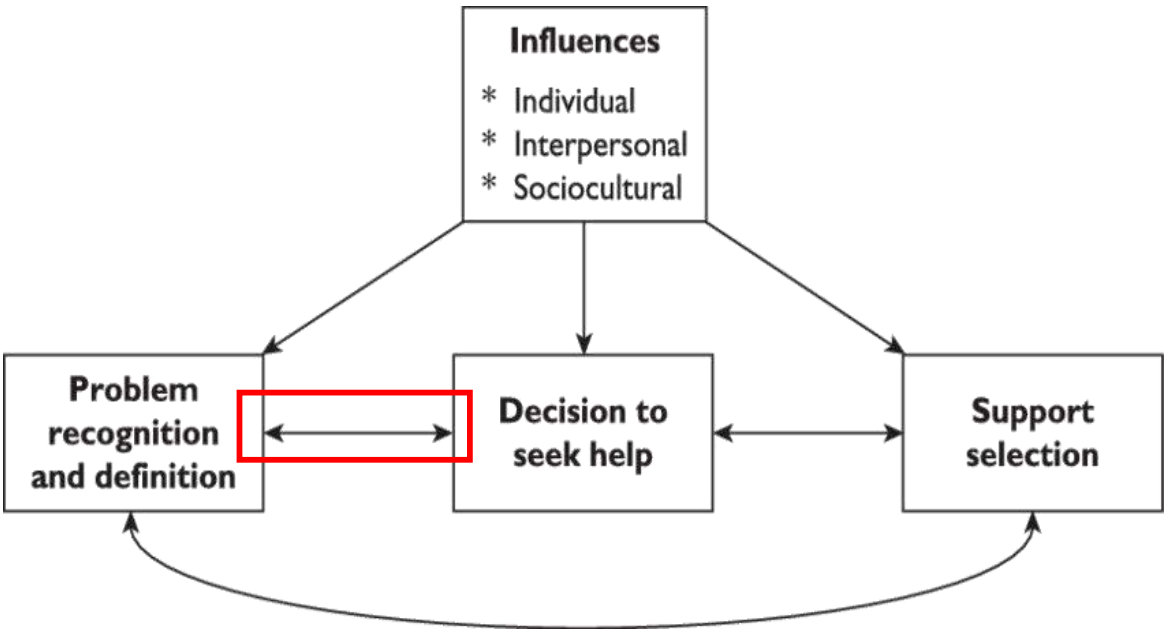

Figure 1. Theoretical framework from Liang et al (2005)

1.3 Preliminary Studies

Preliminary studies include 1) a systematic review focusing on Health Information Technology (HIT) in DV, 2) a national survey Behavioral Risk Factor Surveillance System (BRFSS) quantitative analysis on the association between emotional support, life satisfaction, and perceived health outcomes among DV survivors, 3) a text-mining approach in OHCs (OHCs) to understand the information needs from ovarian cancer patients and 4) A review on harnessing machine learning(ML) to evaluate psychological status from DV.

1.3.1 A systematic review of HIT interventions

1. Systematic review

The purpose of this systematic review was to describe the characteristics and outcomes of HIT interventions in women experiencing DV. This work was presented as a poster at the 2019 American Medical Informatics Association (AMIA) annual symposium. A manuscript has been resubmitted for peer review at the Trauma, Violence, and Abuse.

In this review, the growing trend of HIT developments in the DV field was identified. Women are willing to use HIT as an intervention to improve their health and mental well-being. Therefore, this paved the way for this dissertation to explore victims' and survivors' behavior through technology or OHCs.

1.3.2 BRFSS Survey quantitative analysis

2. BRFSS Survey quantitative analysis

The purpose of this analysis was to explore the association between DV with emotional support, life satisfaction, and perceived health status in the United States. This work was presented as a short presentation at the 2020 Global Health Summit in the Academy of Violence and Abuse (AVA). A manuscript has been published at the BMC Public Health.

This manuscript reported that women with sexual abuse in DV have more mentally unhealthy days and suffer from poor emotional support and life satisfaction than others. Therefore, it is possible to hypothesize women with sexual abuse may prefer to seek help and gain emotional support from an anonymous space like OHCs.

1.3.3 Text-mining approach in OHCs among ovarian cancer patients

3. Text-mining approach in OHCs among ovarian cancer patients

The purpose of this text-mining study was to uncover the information needs among ovarian cancer patients in the OHCs by using the topic modeling technique. This work has been accepted by the American Medical Informatics Association (AMIA) virtual summit in 2021. A manuscript is pending submission to Cancer Nursing.

In this study, text mining techniques were used, including data crawling and cleaning from OHCs by using python programming knowledge. Therefore, this study paved the way for this dissertation to explore the text content in OHCs with the computational method through the text mining python package.

1.3.4 Review of ML applications in domestic violence

4. Review ML applications in domestic violence

This review paper aims to 1) identify the current machine learning application in measuring psychological state in the mental health field and 2) its application in domestic violence, and 3) identify the research gap and future direction of ML from the synthesis. A manuscript is pending submission to the Journal of Medical Informatics Research Public Health and Surveillance.

In this review paper, the current state of science about ML applications in the field of domestic violence was examined. OHCs have been explored for extracting topics discussed and sentiment in the postings. However, the process of help-seeking behavior among women with DV experience is not well-documented.

1.3.5 Article sharing in OHCs among ovarian cancer patients

5. This study aims to determine if any of OvCa OHC users' resource-sharing behaviors are associated with the relevance of these resources. Three resource sharing behaviors were considered: types of resource shared, the purpose of sharing the resource, and OHC users' reactions to resource sharing. A manuscript is submitted to the Journal of medical internet research and is under revision. In this paper, statistical and computation methods were used to analyze the website links shared in OHCs. Therefore, this dissertation started with manual annotation and was followed by both statistical and computation methods to examine the help-seeking result in the DV population.

1.3.6 Other related publication

1. The impact of person engagement index scores and individualized education on the utilization of technology for healthcare, patient satisfaction, and education comprehension among the adult joint replacement population has been evaluated with a healthcare technology company, GetWellNetwork. A manuscript has been accepted in CIN: Computers, Informatics, Nursing.

2. The matters of HEARTS (health, experience of abuse, resilience, technology use, and safety) have been evaluated among older adults in Pittsburgh. This manuscript has been published in Educational Gerontology in 2020.

3. A review of the preponderance of the evidence on whether DV is a risk factor for cardiovascular disease in women has been published in Health in 2019.

4. Improving mental health outcomes of Chinese women survivors of DV through advocacy interventions has been examined. This manuscript has been published in Global Mental Health in 2018.

5. Challenges of an ovarian cancer patient and caregiver online health information seeking. This poster has been accepted in the Association for Information Science and Technology Annual Meeting 2021.

1.4 Methods

1.4.1 Study Design

This study is an exploratory-descriptive study, which leveraged online health communities (OHCs) to explore the help-seeking behavior within the community among women with DV experiences. The study started by exploring what types of help were sought by the adult women with DV experiences and the type of responses provided within the OHCs. Then, we examined the help-seeking result among women with DV experiences in OHCs.

1.4.2 Setting

Sample and data source

Our data was extracted from Reddit, a well-known social network site for information sharing. A subreddit within Reddit refers to an online community dedicated to a particular topic that people write about, and they are denoted by /r/. According to Reddit, their members participated in over 80,000 subreddits (i.e., topically focused sub-communities) and generated over

80 billion views. There are numerous subreddits specific to a disease or cancer that can be considered as OHCs (Park and Conway, 2017). This study used the subreddit (r/domesticviolence), which was about the information and support for DV victims, survivors, and their friends and family, as our OHCs data source.

Reddit is one of the most pervasive open forums that facilitates a unique lens into DV, in terms of victims sharing their stories and subsequent reactions, both positive and negative (Sharma et al., 2017). Reddit has been an interactive and supportive forum for researchers to understand the interaction of users who experienced DV. However, previous Reddit research on DV has only focused on the classification of DV postings (Schrading et al., 2015), discourse analysis on male victims (Sivagurunathan et al., 2021), or content analysis on postings (Lyons & Brewer, 2021). Through Reddit, we analyzed what types of help were sought, what responses they received, and whether their help-seeking needs are satisfied by OHC members. Our study has been exempted by the university's institutional review board, because data are restricted to publicly available tweets/posts (considered 'public conversation') and stripped of identifying personal information.

We used Reddit's Application Programming Interface (API), which is also called the Python Reddit API Wrapper (PRAW) to retrieve data from Reddit. We focused on subreddits: r/domesticviolence. The rationales for choosing Reddit over other social connection sites are multifaceted. First, Reddit does not limit the words for initial postings, which allows victims to share a detailed description of their DV situation. Second, Reddit contains a sub-community for domestic violence (r/domesticviolence) where victims and survivors can interact and share their opinions and experiences in a systematic and centralized way. Conversely, other social networking site like Twitter can only collect data based on hashtags, which could be misused or overused by DV advocacies group, instead of extracting content from women with DV experiences. Third, Reddit serves as a discussion forum to handle each case shared by the victims which provide better

quality in content-based analysis. Fourth, unlike other social media platforms (e.g., Twitter and Facebook), Reddit allows pseudonym accounts and also temporary accounts for a specific purpose, which encourages users to discuss sensitive topics and be more candid in their discussion (Pandrekar et al., 2018).

The data structure included a newly assigned user ID, initial post title, initial post (content), comments, score (the number of upvotes minus the number of downvotes in the postings), ups (the number of upvotes), downs (the number of downvotes) (Figure 2). The inclusion criteria included posts related to how adult women (aged 18 or above) with DV experiences seek advice on DV relationships or dealing with DV-related issues. Posts about non-abused women, women victims under 18, just sharing good news, gratitude posts without any advice needed, or propaganda posts were excluded.

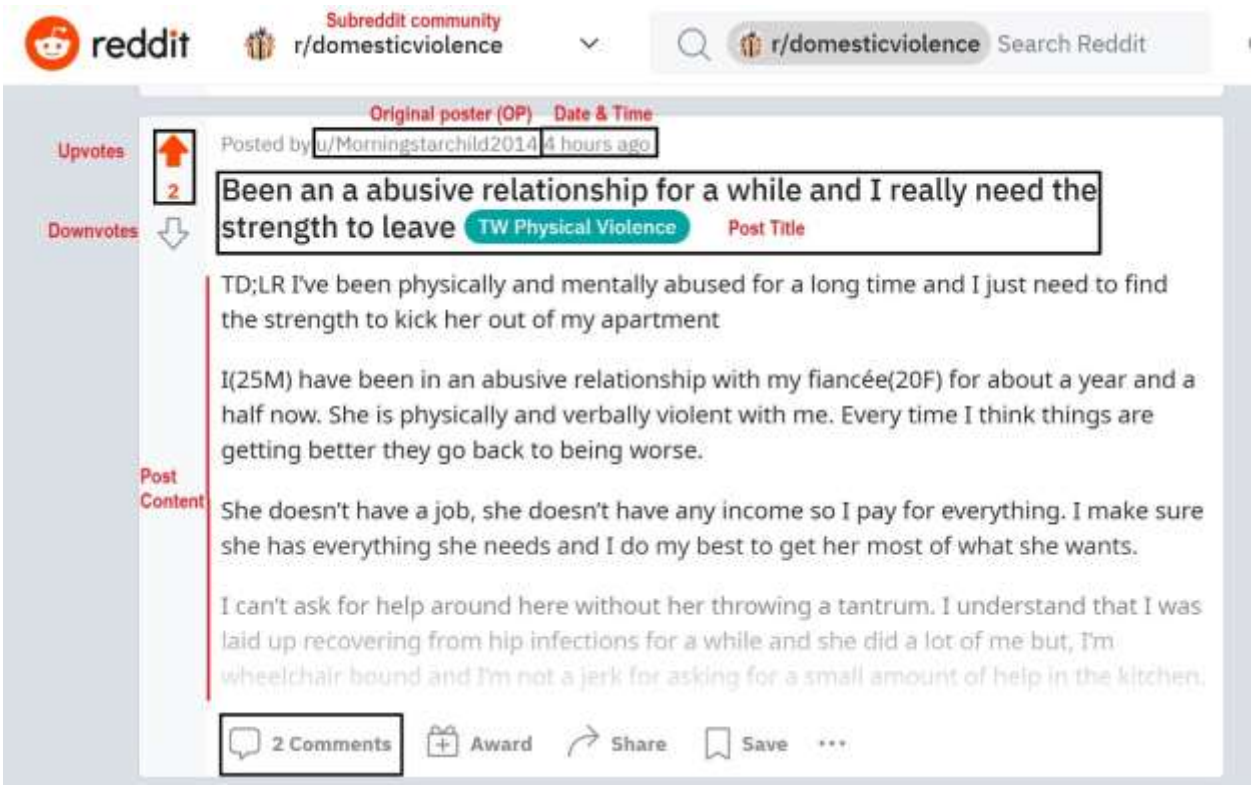

Figure 2. Annotated Reddit interface.

To understand the help-seeking behavior of the original poster (OP), new variables were created to rank the postings for analysis (i.e., number of comments for the initial postings, and number of times original posters (OP) returned. As the Reddit sub-community contains automatic chatbot comments for all the postings about DV, we excluded them from our analysis. For the exclusion criteria, we filtered all non-English posts, propaganda posts, or posts irrelevant to DV from our datasets and eliminated repeated posts or propaganda posts from agencies.

1.4.3 Aim 1 and 2

Aim 1: To describe the types of help sought by the women with DV experiences in OHCs (based on initial postings).

In aim 1, the original postings from Reddit's subreddit community (r/domesticviolence) were annotated according to the following help-seeking information.

Aim 2: To describe the type and pattern (i.e., communication style) of the advice given in the OHC to women with DV experiences (based on comments).

In aim 2, the comments from the same thread annotated in aim 1 were analyzed on the types of help received and the advice pattern given to women in OHCs. Then, the annotated information in both aims 1&2 was reported with descriptive statistics and analyzed by thematic analysis.

1.4.3.1 Variables

1. User Profile

The targeted population for this study is adult women (aged 18 years old or older) who posted their DV stories in English on Reddit. Based on the initial postings, we screened the adult women concerning their age and sex disclosure. Reddit provides messages containing any form of the keyword (e.g., metoo, METOO, #metoo). Each post was returned with associated metadata, containing various post-related and author profile-related characteristics, such as post origin location (latitude and longitude), time of posting, author profile description (age, gender), and several upvotes and previous posts. Location metadata is crucial to geographical analysis. We checked if post-origin latitude-longitude is available from the device used to send the tweet. Otherwise, we resolved the author profile location (e.g., city, state, or country name), if available, using calls to the Google Maps API service. The author's profile location provides an explicit indication of the nationality of particular interest in the analysis of region-specific help-seeking behavior among DV victims. Data were extracted by using python programming software. All personal identifier information cannot be extracted from the Reddit API to protect privacy. Posts in the Archive may contain identifiers for persons who post them, but Reddit API prohibits researchers from extracting personal identifiers. If exact locations like address or geocode are included in the data, we did not collect them for this study. Also, we did not collect data from countries that are included in the General Data Protection Regulation (GDPR) and the Reddit API managed to prohibit any data leakage from these countries for research use according to their data sharing policy.

2. Identifying women who experienced DV (DV characteristics)

Although our data source could not be able to capture all the demographics, it is also important to capture the DV characteristics to understand the help-seeking behaviors in the OHCs. The characteristics of DV were annotated by the following items: types of DV, types of abuse, sex

of victim, and age of victim. These annotated characteristics were used for narrowing down our targeted population to women who experienced DV over 18 years old.

Types of abuse **were categorized into the physical, sexual, emotional, and financial.** For physical abuse, it refers to any slapping, shaking, punching, beating, biting, pushing, pulling hair, pinching, kicking, stabbing, tickling excessively, threatening, abandonment in dangerous situations, property/pet destruction, wielding weapons, use of weapons, denials of medical care, and driving recklessly. Sexual abuse refers to any unwanted sexual acts or forced sexual acts without consent. For emotional abuse, it points to emotional, verbal, or mental abuse including an accusation of infidelity, humiliation, name-calling, isolation, locking out of the home, manipulation, and continuous criticism. Financial abuse refers to restrictions from work or money control.

Age of the victims was captured if the OP discloses them in the initial post. Women aged 18 years old or older were included in the analysis. Any posts describing abuse that occurred in childhood or before 18 were excluded from this study.

3. Help-seeking among women with DV experiences

This study used the definition of help-seeking**,** "the things that people do to avoid being harmed by life-strains" (Pearlin & Schooler, 1978, p.2). The help-seeking behavior is perceived as any action of seeking help from trusted people in the community and includes understanding, guidance, treatment, and general support when dealing with stressful experiences (Rickwood and Thomas, 2012). We identified a post as help-seeking when the OP asks for information or poses questions or requests. We recognized that some women may seek information and support indirectly without directly asking a question or issuing a request for help. Women may simply describe or mention their DV story with an implicit request (e.g., I don't know what to do) which they may be struggling with or feeling a lack of resolution. We included such posts and stories. However, any

postings that contain some aspect of resolution or convey advice/suggestions/argument or advocacy were not categorized as help-seeking and were excluded from this study.

For Aim 1, a codebook based on previous DV help-seeking literature (Satyen et al., 2018; Sivagurunathan et al., 2021) was developed to identify what types of help and responses survivors sought and received. To capture the help-seeking behaviors in Reddit postings, we conducted a descriptive analysis based on the codes and thematic analysis of the original postings. The help-seeking behavior framework developed by Liang et al., 2005 was used to guide our study (Figure 1). We extracted the concepts of 'recognition of the problem', 'decided to seek help', and 'select a source of support to understand the help-seeking behavior after data annotation. For example, 'recognition of the problem' could be represented if the OP posting a thread to ask others whether she is going through DV or not and sought some sources of recognition or validation from others. The concept of 'decided to seek help could be identified after the OP recognize their DV seriousness, and then decided to seek help from other sources suggested by online users. Lastly, 'select a source of support' could be reflected from the comments in the same thread when we trace the comments from the OP. After the recognition of DV and inclination to seek help, it was believed that the OP would be more determined to select a source of support at the end of their thread.

However, this dissertation only focused on the process before the decision to seek help (stage 2) to capture the help-seeking behavior among abused women in OHCs. The types of help sought and received were annotated as follows:

Types of help that women with DV experience sought:

Help-seeking behaviors were evaluated based on the original postings (1) what types of help were asked and based on comments (2) what types of help were received in the same thread on Reddit.

The types of help were divided into specific named and general information. These metrics were designed based on the previous literature about the types of help DV women sought.

A. Types of help sought

General information is defined as any information that is asked implicitly and explicitly in the original postings.

Information support was captured by any mention of the following items: (1) Shelters/DV center/agency, (2) Legal, (3) Childbearing/Child services, (4) Police, (5) Wound assessment/record, (6) DV report procedure/documentation, (7) Safety planning, (8) Food, (9) Housing, (10) Healthcare information (counseling, psychiatrist, etc.), (11) DV survivors' network, (12) DV knowledge, (13) Communication, (14) others – general advice, (14a) others – pet and (14b) Miscellaneous .

Emotional support is captured by any mention related to an explicit and implicit emotional need, such as emotional validation, encouragement, mutual understanding, reassurance, and love. In preliminary exploration, some women were implicitly asking for emotional support by showing their weakness. For example, "I don't know what to do and feel, please advise", "I just want to know I am not alone", and "Does anybody experience something like this? How did you go through it?". After discussion with domain experts, these examples were annotated as seeking emotional support. This variable is captured dichotomously (1) Yes, and (2) No.

Types of help that women with DV experience received:

B. Types of help received

Specific named information is defined as any specific information that is explicitly provided that may be useful for victims to take action, such as DV agency name, phone numbers, websites, social media, and others (e.g., books).

General information is defined as any information that is implicitly provided to help through information support and emotional support.

Information support was captured by any mention of the following items: (1) Shelters/DV center/agency, (2) Legal, (3) Childbearing/Child services, (4) Police, (5) Wound assessment/record, (6) DV report procedure/documentation, (7) Safety planning, (8) Food, (9) Housing, (10) Healthcare information (counseling, psychiatrist, etc.), (11) DV survivors' network, (12) DV knowledge, (13) Communication, and (14) Miscellaneous.

Emotional support was captured by any comments mention about emotional support: (1) Love (e.g., love you and support you), (2) Empathy (e.g., I can feel how difficult this has been), (3) Mutual understanding (e.g., I shared similar experience and gone through the same journey as you), (4) Reassurance (E.g., I promise you will be fine after the therapy), (5) Acceptance (E.g., It's okay not to be okay), and (6) Encouragement (E.g., I will support you in this journey).

Experience sharing was defined as any comments that provided support by sharing relatable experiences of living with DV. This was a dichotomous variable coded as (1) Yes, or (2) No.

Networking offer sharing was captured by any comments that welcomed OP to contact them or provided their contact information in OHCs. This was a dichotomous variable coded as (1) Yes, or (2) No.

1.4.3.2 Data Analysis for aim 1 & 2

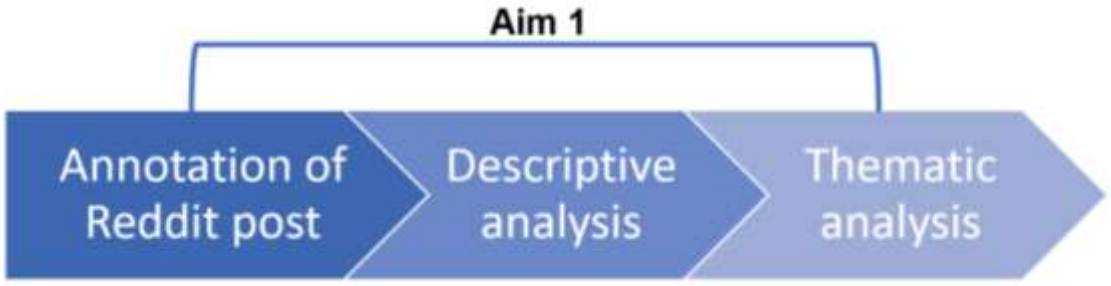

Figure 3. Workflow Diagram of the Proposed Study Aim 1 and 2.

Exploring what types of help were sought among survivors with DV experiences on OHCs through qualitative analysis involved three steps, which will be described in more detail below (Figure 3). A qualitative description could provide a comprehensive summary of what sources of help were sought (and received) among survivors with DV experiences. Also, qualitative description keeps the originality of the content and reduces the biases of the investigator through data collection influence (Patton, 2015). The Consolidated Criteria for Reporting Qualitative Research (COREQ) was utilized to ensure each section of the research process was accurately reported during the qualitative analysis of this study (Tong, Sainsbury, & Craig, 2007). First, a codebook was developed to guide the human annotators about the concepts and definitions. Second, annotators coded the dataset and evaluate the agreement in a sample of 250 postings from Reddit for this aim. The sample of 250 postings was determined based on the number of postings that were filtered after inclusion criteria screening and reached saturation on codebook development. Third, we conducted a quantitative descriptive analysis of what types of help (and responses) were sought(/received), subsequently with a thematic analysis of initial postings.

Phase 1: Data annotation

The data source was from Reddit, the subreddit community, and r/domesticviolence. As the first step, data were crawled from 14 November 2020 to 14 May 2021 by Reddit API. Initially, 998

postings were manually screened on missing or problematic data and 500 postings were manually selected for help-seeking behaviors coding (Figure 4).

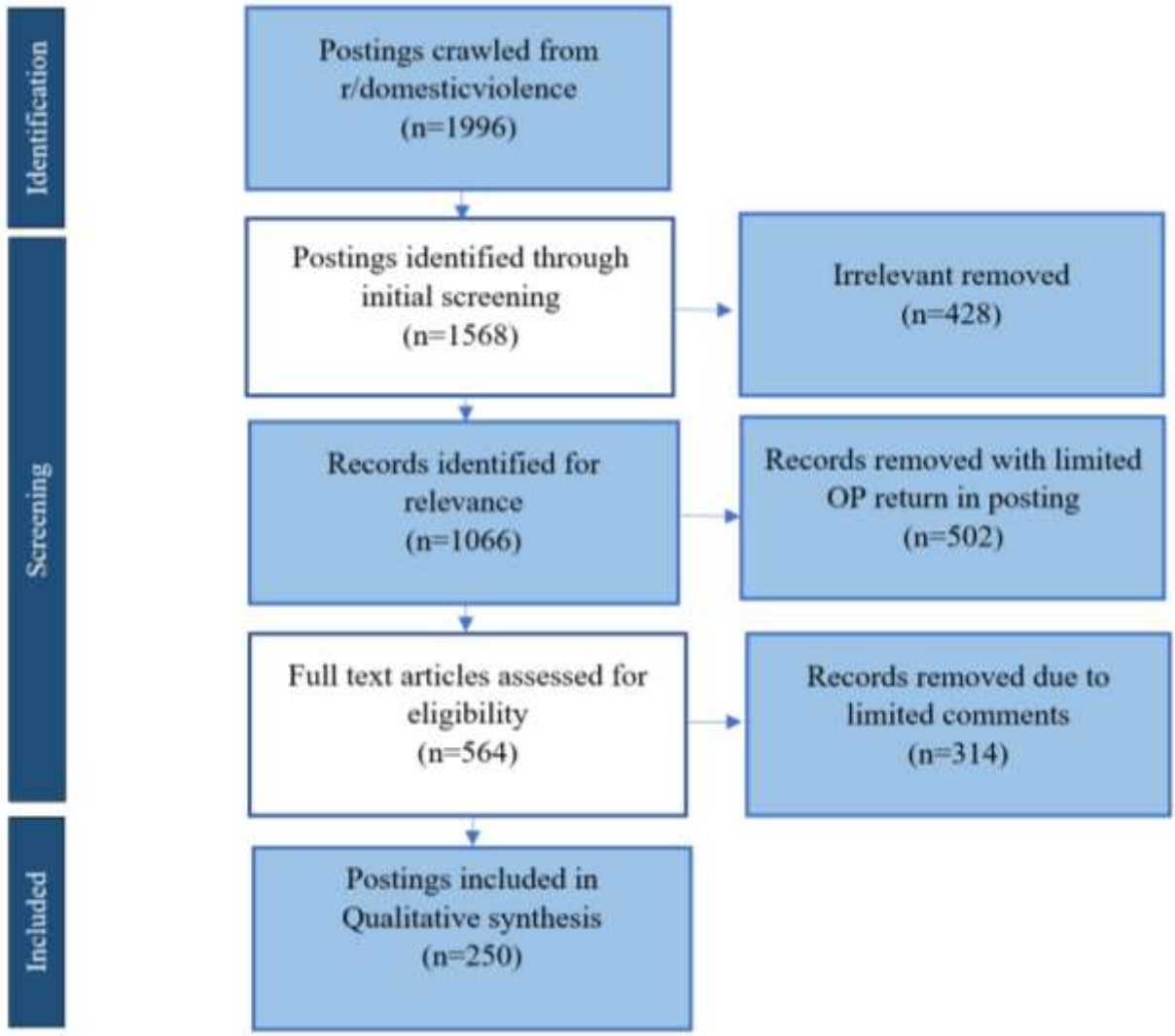

Figure 4. Flow chart – data crawling and annotation process

As a first step, 100 postings were analyzed and used to develop a codebook for systematic annotation between two nursing researchers (Table 1). After building the codebook, we decided to apply the codebook to a total of 250 postings. Since we have manually checked the eligibility of our dataset (i.e., 1996 postings), 50% of the postings were included after relevance identification (i.e., 1066 postings). Therefore, we aimed to include and analyze about 25% of the available data (i.e., 250 postings) for this dissertation study. Previous literature also reported a similar sample

size of about 100 postings in the context of the male DV population (Sivagurunathan et al., 2021). As most of the DV victims are women, we assumed that OHCs could extract more data for women with DV experiences compared to men. Therefore, annotating 250 postings would be good enough to justify for sample size in this population. In the codebook, the variables included specific named information (agency name, phone, website, social media, other), general information (information and emotional support), experience sharing, networking offer sharing, (Appendix A), help-seeking result classification (Yes/No/Partly/Broadly coverage). Excel spreadsheets were created for manual annotation for each concept in the postings, and clues for each annotation were required for quality check. Weekly discussion meetings were carried out between two annotators (one graduate student, and one undergraduate student) from the School of Nursing, and annotation definition adjustments were verified by project advisors and domain experts.

Phase 2: Reliability of the coded dataset

The coding agreement between two annotators was calculated using the Kappa agreement. The Kappa statistic is a measure of inter-rater reliability. Kappa agreement was calculated using the SPSS statistics software package.

Phase 3: Descriptive analysis

To explore the help-seeking behaviors among survivors with DV experiences, we reported the descriptive statistics (i.e., frequency and percentage) of codes in help-seeking behaviors (i.e., specific named, general information, experience sharing, networking offer sharing, of help-seeking).

Phase 4: Thematic analysis of initial postings (and responses)

This phase analyzed the initial posts based on the form of thematic analysis (template analysis) outlined by Brooks et al. (2015), which divided the analysis into six steps shown in (Table 1). The initial coding framework for aim 1 was developed based on an existing framework

developed by Sivagurunathan et al (2021) which examined help-seeking behavior on Reddit in the male DV population.

Table 1. Thematic analysis (i.e., template analysis) procedure for the proposed study.

The order of analysis	Description
1. Become familiar with the postings	Read through the postings in full at least once.
2. Carry out preliminary coding of the data	Highlight anything in the text that might contribute to a theme
3. Organize the emerging themes into meaningful clusters	Start to build the hierarchical relationships, including smaller themes under a broad theme.
4. Define an initial coding template	Develop the initial version of the coding template based on a subset of data.
5. Apply the initial template to further data and modify it as necessary	Apply the initial coding template to the dataset and see if any new theme emerged and revise the codebook
6. Finalize the template and apply it to the full dataset	If the codes have captured all the elements for the research questions, the finalized version of the codebook template will be applied to the full dataset.

1.4.4 Aim 3

Aim 3: To examine whether the needs of women with DV experience were matched with the help they received in OHCs.

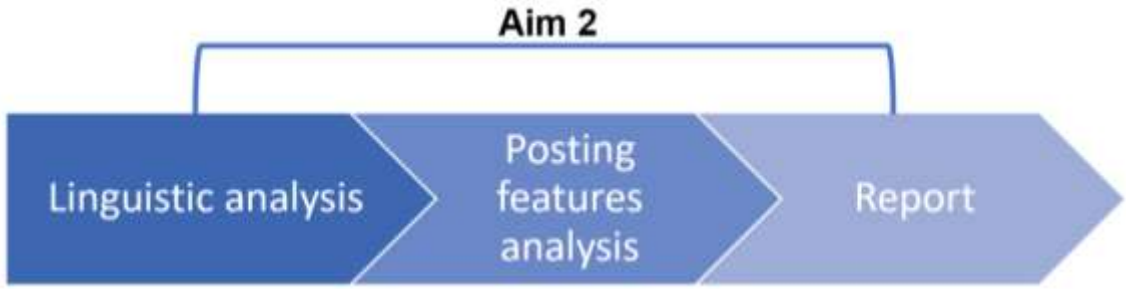

Figure 5. Workflow diagram of the proposed study aim 3.

In aim 4, based on the initial post and responses from the OP, this study extracted the linguistic and postings features to explore the difference between help-seeking results in OHCs. To capture the help-seeking result among women with DV experience on OHCs, this study operationalized with the following variables:

1.4.4.1 Variables

1. Posting and linguistic features: To capture the post difference between matched help and unmatched help postings among women with DV experiences, we included the following postings and linguistic features to explore the differences.

Table 2. Posting features for linguistic analysis in the proposed study

1.	Post score: the total number of "thumbs up" included in the post.
2.	Post comments: the total number of comments in the post.
3.	The number of times OP back: how many times OP returned and commented on the post.
4.	The number of words on comments: how many words are on the comments in total.
5.	Title sentiment score: the sentiment score is based on the title.
6.	Links shared: how many links are shared in each post.
7.	Emoji use: how many emojis are used in each post.
8.	Parts of speech tags: how many nouns, verbs, and adjectives are in each post.

2. *Linguistic Inquiry and Word Count (LIWC)*

The Linguistic Inquiry and Word Count (LIWC) is a tool to calculate the frequency of words matched in linguistic dimensions (e.g., pronouns, verbs), psychological constructs (e.g., positive and negative emotions), and personal concerns (e.g., death) (Pennebaker et al., 2007). There are 93 categories in LIWC in total, all the features are integer or fractional values, meaning the percentages of words in specific categories (Appendix B). Some categories related to the empowerment concept will be constructed as features for model development. LIWC is proven to be useful in the context of personality traits prediction and emotion prediction. In terms of communication in the cancer population, a study has applied LIWC to explore the linguistic differences, and language use differences in Reddit posts (Anietie & Uduak, 2021). LIWC has also been applied to extract the linguistic cues for knowledge adoption (Chen, 2020) information adoption (Kafeze et al., 2014), perceived helpfulness in online health reviews (Shah et al., 2021), and has also been utilized in understanding the psychological behavior or people in OHCs (McDonnell et al., 2020).

1.4.4.2 Data Analysis for Aim 3

We explored the help-seeking result in OHCs by evaluating the degree of matching needs based on manual matching and statistical analysis. Since we wanted to explore the language differences between matched and unmatched help postings among DV victims and survivors in OHCs, text mining methods were applied to assist the analysis for this aim. We used two types of textual features (i.e., linguistic inquiry and word count [LIWC], and posting linguistic features) to identify the top-ranked linguistic cues derived from the dataset that will be most informative for

recognizing the adoption of information in OHCs. The top-ranked linguistic cue and posting features were identified by their frequency.

Linguistic features

We obtained the descriptive data by scraping Reddit. Descriptive data includes the number of upvotes, downvotes, scores, comments, links shared, words on the initial post, number of emoji used, and the sentiment score in the initial post. We included different linguistic features in our data analysis. First, the length of the post including word count in both initial postings and comments was extracted to represent the length and complexity of the messages. Second, we examined the parts of speech tags (POS) by calculating the nouns, adjectives, and verbs to capture the emotional cues. Third, the number of question marks, modal verbs, and affirmative and negation sentences were also under consideration.

We also analyzed the frequency and percentage of linguistic features from the LIWC tool (Tausczik & Pennebaker, 2010). We included LIWC scores in our analysis as an exploratory way to look at the help-seeking result in OHCs. In LIWC, we included psycholinguistic features. Among 93 features, only 28 could be considered psycholinguistic features divided into five categories, namely, emotional affect, cognitive process, self-focus, social relationships, and perceptions. For instance, we computed several measures (i.e., measure refers to the words with similar themes grouped into the same psychosocial category) to capture the help-seeking result using LIWC: affective processes (e.g., positive emotion, negative emotion, anxiety, anger, sadness), cognitive processes (e.g., insight, causation, discrepancy, tentative, certainty, differentiation), perceptual processes (e.g., see, hear, feel), and drives (e.g., affiliation, achievement, power, reward, risk). We calculated frequencies of terms that fall under each

category and use these frequencies as values for each category. After running the analysis from LIWC, we explored the difference between the two groups (i.e., matched help vs. unmatched help)

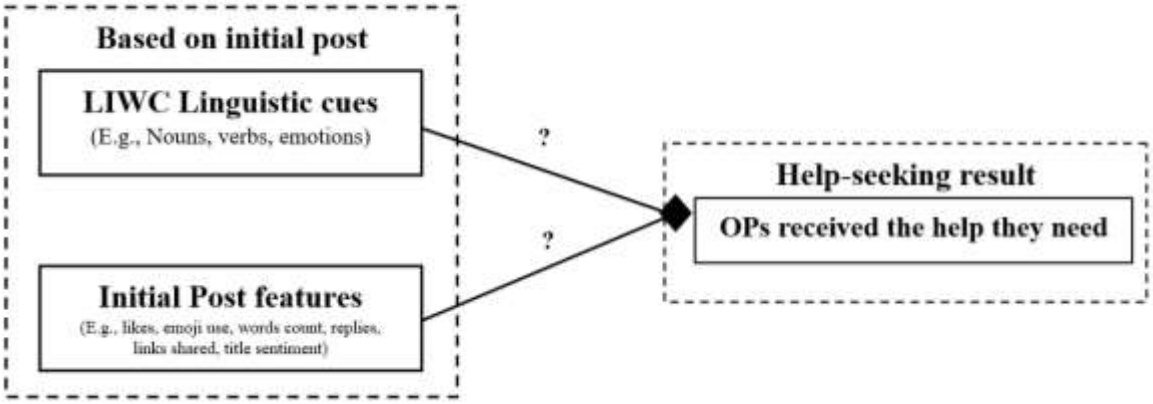

Figure 6. The research model for factors influencing the help-seeking result (i.e., matching needs) in DV OHCs for the proposed study.

(Note. OP=Original poster.)

Within the OHCs, DV survivors can seek medical information, make social connections, or express their feelings after the DV experiences. Users of Reddit, as a medium for information delivery, prefers to seek help from others if the content is solid and convincing. However, since women with DV experiences have been traumatized, previous research indicated that they need more emotional support and more time to accept help than other populations (Fugate et al., 2005). Therefore, this study would like to answer the question (1) whether the OP received the help they

requested and (2) whether the linguistic and postings features from the initial posts are related to the help-seeking result (i.e., matched help or unmatched help)

In terms of data analysis, descriptive statistics were conducted on the 250 postings in terms of linguistic cues and post features, including mean, standard deviation, minimum and maximum.

Parametric and non-parametric test

To compare the mean difference between two groups (i.e., matched needs and unmatched needs), parametric and non-parametric tests were conducted between the independent variables. For variables with normal distribution, a t-test was used. Conversely, Mann-Whitney U was used to determine the mean difference. Statistical significance was indicated by a 2-sided p-value of <.05. Data was analyzed by using IBM®'s Statistical Package for the Social Sciences (SPSS) SPSS® Statistics Version 26 (IBM Corp, 2017).

Potential limitations and alternatives

Given that we already have established our datasets and methodologies, our analysis should be straightforward. Nonetheless, although highly unlikely, no linguistic features will be found to evaluate how people show their acceptance of information and how people react to the comments in Aim 3, which could be due to the quality of our dataset or text mining methodology. From our literature review, social media is a novel channel to express thoughts, generate ideas, and connect people around the world. The mechanism and association between social media and help-seeking in the DV context have not been explored with text mining techniques before. Therefore, it will not be a stumbling block for our team to advance and inform science for assisting domain experts or practitioners in making data-driven decisions. Another limitation is that our theoretical framework is based on help-seeking literature in the DV field, which has not been applied in OHCs

before. We utilized concepts from the framework to guide our study such as extracting the concepts for codebook development and understanding the postings based on help-seeking stages.

1.5 Human subjects

This is a minimal risk study as there is no direct benefit to individuals whose data were used in the study. As all our data were collected from a public data source like online social media, which is permissible for research use, this research protocol has been approved as an exempt by the University of Pittsburgh Institutional Review Board. The only foreseeable risk to the research subject is a breach of confidentiality. We ensured that all study team members did not work outside the school for data management and use encrypted software for data sharing only. Documents and datasets were encrypted to secure safety and patient privacy. No personal identifiers or specific geographic locations other than the city were collected for this study.

1.6 Study timeline

	2021	**2022**	
	Nov-Feb	Mar-Apr	May-July
AIM #1	**X**		
Annotation	X		
Text cleaning and pre-processing	X		
Descriptive analysis	X		
Manuscript writing	**X**	**X**	
AIM #2 & 3	**X**	**X**	
Comments analysis		X	
LIWC linguistic feature		X	
Final report		**X**	**X**

2.0 Manuscript dissertation #1 (HIT in DV)

2.1 Introduction

Domestic violence (DV) is a global health issue that threatens the well-being of people around the world. According to the United States (U.S.) office on Violence against Women, DV refers to a pattern of abusive behavior in any relationship that is used by one partner to gain or maintain control over another intimate partner (Department of Justice, 2019). An array of abuse that could happen within a household including physical abuse, sexual abuse, financial abuse, and psychological abuse (Department of Justice, 2019). In the U.S., twenty people experience intimate partner physical violence every minute, which adds up to 10 million abuse victims annually (Black et al., 2011). Moreover, DV has a considerable monetary impact on the U.S. The estimated cost per female who experiences DV is $103,767 (Peterson et al., 2018).

Women are three times more likely to experience DV as compared to men (National Centre for Injury Prevention and Control, 2012). DV is associated with poor physical and mental health, including hypertension, diabetes (Dolezal, 2009), AIDS/HIV infection (Li et al., 2014), depression, anxiety, and posttraumatic stress disorder (PTSD) (Carlson et al., 2003; Golding, 1999; Hathaway et al., 2000), sleep disturbances (Breiding et al., 2014), and suicide attempts (Devries et al., 2011). However, the severe effects of DV on women are underestimated due to its complexity, the prevalence of revictimization, and an intergenerational cycle of violent experiences (Desai et al., 2002).

Intervention studies are essential to help the victims step out from the shadows, break their silence and improve their health. However, studies involving women who experience DV often posed significant challenges. Previous research has identified the difficulties in approaching

victims and survivors face-to-face because of stigmatization, shame, guilt, alienation, and judgment (Choo et al., 2015; Suler, 2004; Tarzia et al., 2017). Previous intervention strategies including face-to-face interviews, group counseling, and individual therapy take time to recruit participants, and have the risk of confidentiality among participants, while technology-enabled interventions and guided online support provided an anonymous environment, without the time and location constraints for victims and survivors to access information and reach out for help (Ranney et al., 2013). Women victims of DV are more vulnerable due to limited access to resources and more child and housework responsibilities. Studies showed that women victims were more emotional and prefer to use texting to communicate with providers, as it gave them a feeling of anonymity (Gilroy et al., 2013).

Recently, health information technology (HIT) has shed light on DV research to develop more effective screening tools and improve the quality of life for DV victims. HIT is defined as the application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of healthcare information, health data, and knowledge for communication and decision making (Thompson et al., 2004). Technology users can easily access the resources regardless of their location which can reduce the gap in limited access to resources. With HIT available on mobile devices, women victims may easily obtain an abundance of health information and increase disclosure of their abuse (Constantino et al., 2007). However, the current literature mostly lies in one specific intervention being introduced without any evaluation. A systematic evaluation of HIT in addressing DV can help direct further research and advance clinical and technological applications for health professionals.

Thus, the purposes of this systematic review are to describe the characteristics and outcomes of HIT interventions in women experiencing DV. Traditional intervention for women with DV experiences includes advocacy work, help-seeking, empowerment, education, and

prevention (Coker et al., 2012; Tiwari et al., 2018). However, we do not know whether these interventions are transformed to HIT intervention yet. In order to capture all types of HIT intervention in DV domain, we captured the definition of DV includes all kinds of violence that can happen in a household setting including child abuse, elder abuse, and intimate partner violence, in this manuscript

2.2 Methods

Search Strategy: Literature searches were conducted from January 2008 to December 2019 from five electronic databases: PubMed, Ebscohost CINAHL, Ovid PsycINFO, and Scopus. The initial screening also included Google Scholar. A health sciences librarian designed and built the PubMed search and translated the search for use in other databases. All search strings utilized natural language and (when available) controlled vocabulary to represent the concepts of 'technology' and 'family or domestic violence'. We applied different keywords for the concept of technology including 'smartphone', 'mobile application', 'cellular phone', 'Internet', 'videoconferencing', and 'text messaging'. For the concept of domestic violence, 'spouse abuse', 'elder abuse', 'child abuse', 'child maltreatment', 'intimate partner violence', and 'gender-based violence' were used as keywords. When available, search results were limited to English-language articles (Table 3).

Table 3. Search strings from different search engines

Search Engine	Search String
PubMed	(("Mobile Applications"[Mesh] OR "Internet"[Mesh] OR "Cell Phone"[Mesh] OR "Videoconferencing"[Mesh] OR "Crowdsourcing"[Mesh] OR smartphone[tiab] OR app[tiab] OR facebook[tiab] OR Twitter[tiab] OR social network*[tiab] OR social media[tiab]) AND

	("Intimate Partner Violence"[Mesh] OR "Gender-Based Violence"[Mesh] OR "Domestic Violence"[Mesh] OR intimate partner violence[tiab] OR domestic violence[tiab] OR child abuse[tiab] OR spouse abuse[tiab]))
PsycINFO	((online social networks/ OR social media/ OR online community/ OR mobile application*.tiab. OR exp mobile devices/ OR text messaging/ OR computer applications/ OR exp electronic communication/ OR (smartphone* or app or facebook or Twitter or social network* or social media).ti,ab.) AND (domestic violence/ or child abuse/ or elder abuse/ or emotional abuse/ or intimate partner violence/ or marital conflict/ or partner abuse/ OR (domestic abuse or domestic violence or intimate partner violence or child abuse or spouse abuse).ti,ab.)) NOT (0200.pt. OR 0240.pt. OR 0280.pt. OR 0400.pt.)
CINAHL	((TI mobile application* OR AB mobile application* OR TI app OR AB app OR TI smartphone* OR AB smartphone* OR TI facebook OR AB facebook OR TI Twitter OR AB Twitter OR TI social media OR AB social media OR TI social network* OR AB social network* OR MH "Mobile Applications" OR MH "Cellular Phone" OR MH "Text Messaging" OR MH "Smartphone+" OR MH "Crowdsourcing" OR MH "Online Services" OR MH "Social Media") AND (TI domestic violence OR AB domestic violence OR TI domestic abuse OR AB domestic abuse OR TI intimate partner violence OR AB intimate partner violence OR TI spouse abuse OR AB spouse abuse OR TI child abuse OR AB child abuse OR MH "Domestic Violence+")) NOT PT dissertation
Scopus	("domestic violence" OR "domestic abuse" OR "intimate partner violence" OR "spouse abuse" OR "child abuse" OR "partner abuse" OR "gender based violence") ("mobile application*" OR app OR smartphone* OR Facebook OR Twitter OR "social media" OR "cell*phone*" OR "text message*" OR "smartphone*" OR "crowdsourcing" OR "online service*" OR "social media")
Google Scholar	"Mobile Applications" OR "Internet"OR "Cell Phone" OR "Videoconferencing" OR "Crowdsourcing" OR "smartphone" OR "app" OR "facebook" OR "Twitter"OR "social network"OR "social media" AND "Intimate Partner Violence" OR "Gender-Based Violence"

Eligibility Criteria: The articles selected for this systematic review fall into two categories. In the first stage, articles were reviewed based on their titles and abstracts and how they

pertain to technology intervention for domestic violence (Figure 7). In stage two, full-text documents were obtained and reviewed qualitatively with the following inclusion criteria: technology intervention, mobile health, online intervention, web-based, application, domestic violence, intimate partner violence, elder abuse, child abuse, young adult, American women, the United States, and articles in English published between 2008-2019. Exclusion criteria include dating violence, American men, traditional prevention, editorials and commentaries, non-peer-reviewed articles, study protocols, conference abstracts, and non-English articles published before January 2008.

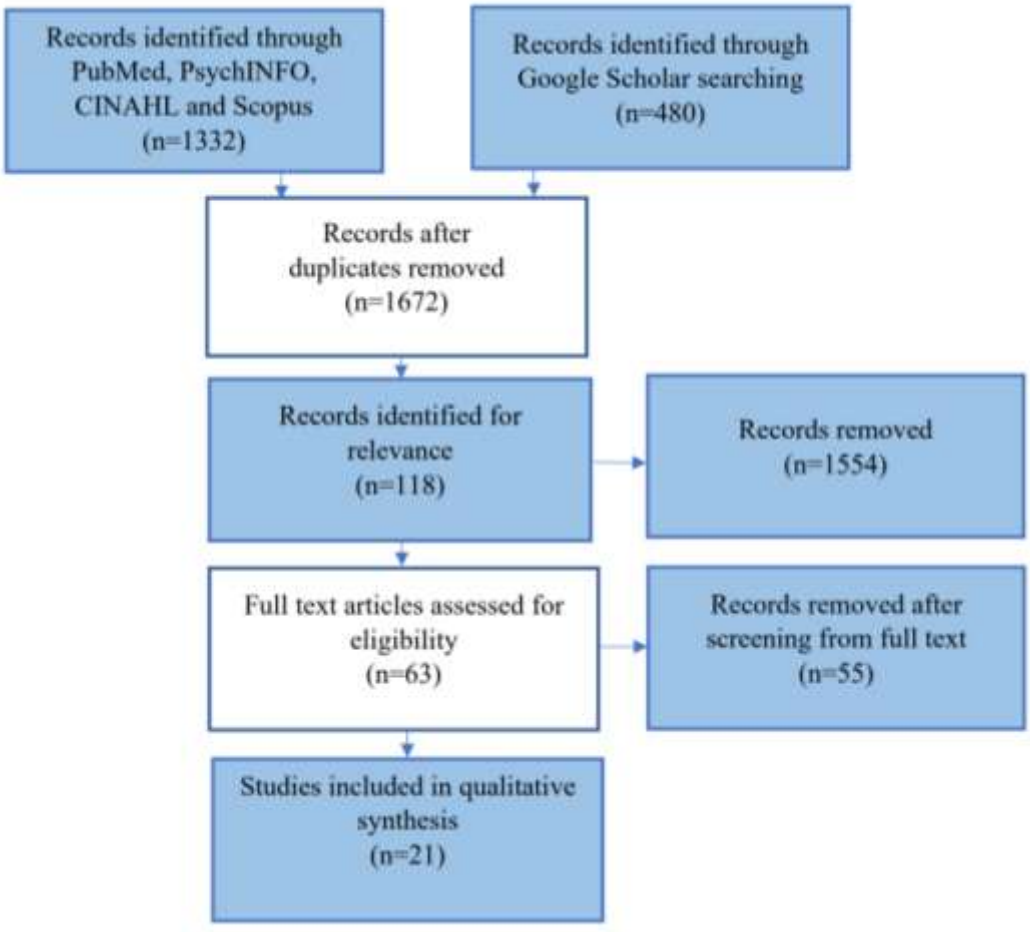

Figure 7. Flow chart - systematic review on health information technology for domestic violence

Selection Process: All of the articles were reviewed qualitatively by the lead author to determine eligibility. Three categories were designated during the selection process: include, exclude, and questionable. Articles for inclusion or exclusion were confirmed by the senior author. All questionable articles and search terms issues were determined by the third author. The review paper selection process was confirmed by the second author. One article was found via a manual search of articles from references of relevant articles.

Data Abstraction: Data were abstracted and entered into a table to evaluate the process in an unbiased, reliable, and valid way. Table variables were categorized in three ways: (1) classification of intervention (study purpose, technology, type of intervention, and abuse), (2) descriptive details (sample size, location, and settings), and (3) outcomes assessment (measurement, data analysis, and interpretation).

2.3 Results

In the initial screening process, 1,332 articles were identified from four databases, and 480 articles were identified from Google scholar for further review. Duplicates and irrelevant articles were removed, and 63 articles underwent a more detailed second-stage screening. Twenty-one articles met all of the inclusion criteria, while 42 articles were removed (e.g., exploratory studies conducted outside of the United States, and non-intervention studies).

Types of technology

There was seven web-based intervention included; five of them collated data from a website (Bloom et al, 2014; Eden et al, 2015; Glass et al, 2017; Sargent et al, 2016; Thraen et al, 2008). There were three online training programs addressed for healthcare professionals in this

review (Blumling et al, 2018; Harris et al, 2009; McAndrew et al, 2014). Three studies utilized mobile devices for their interventions (Goldman et al., 2019; Jabeley et al., 2011; Lefever et al., 2008). Two studies used email interventions (Constantino et al., 2015; Harris et al., 2009). Another two studies used GPS (Gur et al., 2016; Ibarra et al., 2014). There was one article related to videoconferencing interventions (Hassija et al., 2010). Only one study delineated patient simulation technology in harnessing domestic violence (Blumling et al., 2018).

Types of intervention

There were four articles focused on prevention (Bloom et al., 2014; Eden et al., 2015; Glass et al., 2017; Hassija et al., 2010) and eight on education (Blumling et al., 2018; Choo et al., 2016; Constantino et al., 2015; Ejaz et al., 2017; Harris et al., 2009; McAndrew et al., 2014; Paranal et al., 2012; Sargent et al., 2016). Five studies emphasized the effectiveness of intervention (Bacchus et al., 2016; Gur et al., 2016; Goldman et al., 2019; Ibarra et al., 2014; Rothman et al., 2009) and three focused on different types of DV assessment other than women (Jabaley et al., 2011; MacLeod et al., 2009; Thraen et al., 2008). Only one study examined patients for screening purposes (Lefever et al., 2008).

Participant characteristics

Different types of victims or potential victims were included, such as pregnant women (Bacchus et al, 2016; Bloom et al., 2014), adolescent mothers (Lefever, et al., 2008), battered women (Rothman et al., 2009), and abused women (Glass et al, 2017 and Hassija et al., 2010). Simultaneously, participants expanded to different professions like nursing (Blumling et al., 2018) dental students (McAndrew et al., 2014), physicians (Harris et al., 2009), and law enforcement officers (Goldman et al., 2019).

Sample sizes across studies ranged from 11 to 1,869. The sample characteristics and demographics were diverse. Most studies were recruited from clinical areas, community-based

organizations, and schools (e.g., hospitals, clinics, shelters, and criminal justice services departments). The mean age across studies ranged from 7 to 40 years. The socioeconomic status and abuse background of participants were not consistently reported. Multiple ethnicities are included in our review studies, including White, African American, Hispanic Latino, Asian, and others; however, the samples were mainly White (N=13). Thirteen articles were conducted in metropolitan areas (Bacchus et al., 2016; Choo et al., 2016; Constantino et al., 2015; Eden et al., 2015; Ejaz et al., 2015; Glass et al., 2017; Harris et al., 2009; Jabaley et al., 2011; Lefever et al., 2008; Mc Andrew et al., 2014; Paranal et al., 2012; Rothman et al., 2009; Thraen et al., 2008) whereas only one article (MacLeod et al., 2009) was done in a rural area. Four articles highlighted domestic violence in both metropolitan and rural areas (Gur et al., 2016; Hassija et al., 2010; Ibarra et al., 2014; Sargent et al., 2016).

Types of violence

Four types of abuse were covered. Ten studies highlighted intimate partner violence (Bacchus et al., 2016; Bloom et al., 2014; Blumling et al., 2018; Choo et al., 2016; Constantino et al., 2015; Eden et al., 2015; Glass et al., 2017; Harris et al., 2009; McAndrew et al., 2014; Rothman et al., 2009), six illustrated child abuse (Goldman et al., 2019; Jabaley et al., 2011; Lefever et al., 2008; MacLeod et al., 2009; Paranal et al., 2012; Thraen et al., 2008), four highlighted DV (Gur et al., 2016; Hassija et al., 2010; Ibarra et al., 2014; Sargent et al., 2016), and one study was based on elder abuse (Ejaz et al., 2017).

Study designs

Research methods vary from randomized controlled trials (N=5) (Bacchue et al., 2016; Choo et al., 2016; Eden et al., 2015; Glass et al., 2017; Sargent et al., 2016) and longitudinal (N=1, Lefever et al., 2008), mixed methods (N=2, Constantino et al., 2015; Thraen et al., 2008), feasibility testing (N=5, Bloom et al., 2014; Blumling et al., 2018; Ejaz et al., 2017; Goldman et

al., 2019; Gur et al., 2016;), quasi-experimental (N=1, McAndrew et al., 2014), non-equivalent group design (N=1, Paranal et al., 2012) and qualitative studies (N=1, Ibarra et al., 2014).

Intervention Outcomes

Physical safety outcomes

Five studies reported safety outcomes related to physical health (Bloom et al., 2014; Choo et al., 2016; Eden et al., 2015; Glass et al., 2017; Lefever et al., 2018). One study examined the abuse score for physical violence and sexual violence (Choo et al., 2016), while the other one measured the neglect score for children at home (Lefever et al., 2008). Both studies showed a reduction in abuse and neglect scores. Three other studies demonstrated the improvement in safety strategies, safety behaviors, and danger assessment by different methods and diverse measurements (Bloom et al., 2014; Eden et al., 2015; Glass et al., 2017).

Psychological outcomes

Three articles highlighted depression, anxiety, and Post-Traumatic Stress Disorder (PTSD) as psychological health outcomes (Bloom et al., 2014; Constantino et al., 2015; Hassija et al., 2010). Bloom et al (2014) Constantino et al (2015), and Hassija et al (2010) showed improvement in depression, Constantino et al and Bloom et al also reported improvement in anxiety and PTSD outcomes from the intervention. One article measured the improvement in social support (Constantino et al., 2015).

Technological outcomes

Seven studies assessed the effectiveness of a technological intervention, which demonstrated high usability, feasibility, and acceptability (Bloom et al., 2014; Choo et al., 2016; Ejaz et al., 2017; Goldman et al., 2019; Hassija et al., 2010; Lefever et al., 2008; Thraen et al., 2008). Bloom et al (2004), Choo et al (2016) and Thraen et al (2008) measured the usability, while Bloom et al (2014), Choo et al (2016), Ejaz et al (2017), Goldman et al (2019), Hassija et al (2010),

and Lefever et al (2008) measured feasibility testing, and Choo et al (2016) also measured the acceptability of the intervention.

Table 4. Literature summary - critical findings

No.	Authors (Year)	Purposes of the study	Types of technology	Types of intervention	Participants characteristics			
					# and types of participants	Location	Races	Age
1	Bacchus, et al (2016)	Explore perinatal home visitors' and women's perceptions and experiences of the Domestic Violence Enhanced Home Visitation Program (DOVE) using mHealth technology or a paper-based method.	Domestic Violence Enhanced Home Visitation Program (DOVE) mHealth Technology	Exploration	26 (Pregnant women)	Metropolitan area	White, Black, Mixed	20-27 mainly
2	Bloom, et al (2014)	Evaluate the feasibility of Internet-based safety planning for rural and urban abused pregnant women and practicality of recruitment procedures for future trials.	Online safety planning intervention	Prevention	46 (Pregnant women)	N/A	White	25
3	Blumling, et al (2018)	Evaluate a standardized patient simulation experience depicting a victim of IPV on undergraduate nursing student knowledge and confidence in assessment and intervention of IPV	Standardized patient simulation	Education	57 (Nursing students)	N/A	N/A	N/A
4	Choo, et al (2016)	Examine the feasibility and acceptability of a computer-based program and telephone booster for drug-using women reporting IPV.	Web-based BSAFER intervention and booster phone calls	Education	40 (Drug abused women)	Metropolitan area	Non-white, Hispanic/Latino	25
5	Constantino, et al (2015)	Compare the effectiveness of online, face-to-face and waitlist control intervention of the HELPP based on personal, interpersonal and community level	Online, face-to-face, Wait-list control HELPP intervention 'Email'	Education	32	Metropolitan area	White, Black, Asian	40
6	Eden, et al (2015)	To test the effectiveness of a safety decision aid compared with usual safety planning (control) delivered through a secure website, using a multistate RCT design.	Internet safety decision aid	Prevention	708	Metropolitan area	White, Black, Asian, Native American, Hawaiian or Pacific Islander Other, Multi-racial	33

7	Ejaz, et al (2017)	Comparing the managers' knowledge change after receiving educational online training modules about the background of abuse, screening and reporting abuse.	Online training modules	Education	453 (Managers)	Metropolitan area	N/A	N/A
8	Glass, et al (2017)	To compare the safety and mental health outcomes at baseline, 6 months, and 12 months among abused women randomized to (1) a tailored, internet-based safety decision aid or (2) a control website.	Internet safety decision aid	Prevention	672 (Abused women)	Metropolitan area	White, Black, Asian, Native American, Hawaiian or Pacific Islander, Other, Multi-racial	33
9	Goldman, et al (2019)	Examine the knowledge level and feasibility of using a smartphone application to identify victims of sexual exploitation.	SART START smartphone application	Assessment	103 (Law enforcement officers)	N/A	White Asian Black Other	31-40 mainly
10	Gur, et al (2016)	Explore the use of GPS for domestic violence or Intimate Partner Violence in pretrial programs	GPS	Exploration	114	Metropolitan and rural areas	White	70% were 40 or older
11.	Harris, et al (2009)	Evaluate the costs and effectiveness of promoting online CME about IPV training to physicians.	Free CME online program	Education	1869 (Physicians)	Metropolitan area	N/A	N/A
12	Hassija, et al (2010)	To evaluate the effectiveness and feasibility of videoconferencing technology to provide evidence-based treatment to rural domestic violence and sexual assault populations	Videoconferencing	Prevention	13 (Abused women)	Metropolitan and rural areas	White	30
13	Ibarra, et al (2014)	To examine 'styles of surveillance' among community corrections officers using Electronic monitoring, by employing a specific and comparative analysis from GPS in DV in the context of pretrial supervision	GPS	Exploration	50	Metropolitan and rural areas	N/A	N/A
14	Jabaley, et al (2011)	Examine the iPhone™ when used as an assessment tool and an enhancement to an evidence-based, in-home child safety intervention.	iPhone™	Assessment	3 families	Metropolitan area	N/A	N/A
15	Lefever, et al (2008)	Assess the feasibility of using cell phone interviews to learn more about the quality of daily parenting and child neglect.	Cell phone interview	Screening	Study 1:45 Study 2: 544 (Adolescent mothers)	Metropolitan area	African, European, Hispanic, other ethnic	Adolescent mother: 17.5 (average)

								Adult mother: 26.5 (average)
16	MacLeod, et al (2009)	To assess whether telemedicine would increase the ability of the rural provider to perform a complete and accurate sexual assault examination.	Telemedicine video-conferencing	Assessment	42	Rural area	N/A	7
17	McAndrew, et al (2014)	To determine whether the dentistry's online tutorial on domestic violence is effective for dental students poised to embark on their professional careers	Online tutorial	Education Prevention Detection	25 (Dental students)	Metropolitan area	N/A	N/A
18	Paranal, et al (2012)	To discuss the benefits and limitations of conducting online organizational trainings from the perspective of participants, including what participants found effective, what challenges were most commonly encountered, and trainee perspectives of the program's overall impact	Online training	Education	218	Metropolitan area	N/A	N/A
19	Rothman, et al (2009)	To assess the proportion of battered women's shelter residents who use e-mail in communication	E-mail	Assessment	57 (Battered women)	Metropolitan area	White, Black, Hispanic, Asian, others	30
20	Sargent, et al (2016)	To assess the effects of an online program (Change A Life) designed to educate individuals about children's exposure to domestic violence, and to increase individuals' self-efficacy for providing support to children exposed to DV.	Online program	Education Prevention	255	Metropolitan and rural area	White, Black, Hispanic, Asian	39
21	Thraen, et al (2008)	Evaluate the usability and satisfaction differences on a Web-based application developed for the remote sharing of child maltreatment assessment.	Web-based application TeleCAM	Assessment	11	Metropolitan area	White, African, American	N/A

Table 5. Literature summary critical findings continued.

No.	Authors (Year)	Types of violence	Research design	Intervention outcome		
				Physical safety outcomes	Psychological outcomes	Technology outcomes
1	Bacchus, et al (2016)	IPV	Qualitative interviews	N/A	N/A	"The technology helped reduce the anticipated stigma associated with disclosing abuse." "The computer tablet viewed as a safe and confidential way for DV women to disclose their experiences; tablet helped to establish trust and rapport between victim and providers; The technology helped reduce the anticipated stigma associated with disclosing abuse."
2	Bloom, et al (2014)	IPV	Convenience sampling	Danger score (M= 6.1) indicated severe danger in the abusive relationship.	Exposure to reproductive coercion, maternal depression, PTSD, birth and infant feeding outcomes, safety strategies, danger assessment	The average time to completion was 10.3 days (SD = 16.3 days , range = 0-68 days), with rural women taking an average of 2.2 days longer than urban women (11.6 vs. 9.4 days, respectively). A higher percentage of rural women (63.2%) reported using a home computer compared with their urban counterparts (48.4%). A lower percentage of rural women used a computer at a friend's or family member's house (25.3% vs.

				34.3, respectively) 20% of e-mail contacts from potential participants originated from a mobile device. 19.5 % of the women completed the baseline session from a mobile device. The average danger assessment score was 16.1 which indicates severe danger in the abusive relationship.
3	Blumling, et al (2018)	IPV	Convenience sampling	It demonstrated significant increase in confidence between pre-test and protest after the simulation Pretest mean: 14 v.s. Protest mean: 21.93 A significant effect for change in knowledge over time. $F(2,112)=20.71$, $p<0.001$. The effect size for the measures is 0.279, is considered large. The mean values for knowledge increased from 6.96 (SD = 1.36) to 7.95 (SD =1.47) and to 8.05 (SD =1.27) over three periods. The increase in knowledge is greatly

					significance F(1,56) = 0.632, p>0.10 *Standardized patient simulation appears to enhance nursing student confidence and knowledge of assessing and intervening with victims of IPV.*
4	Choo, et al (2016)	IPV	RCT	Past month drug use, measured by a modified version of the Timeline Followback (TLFB) and the Composite Abuse Scale (CAS) for the occurrence of psychological, physical, and sexual violence.	*1. The web-based intervention plus telephone booster highly feasible in the emergency care setting.* *2. High acceptability, satisfaction and usability in the web-based intervention evaluation.*
5	Constantino, et al (2015)	IPV	Sequential, transformative mixed-methods design	Anxiety, depression, anger, personal and social support. Anxiety pre-test score and post-test score for each of the groups were as follows: ONL was M = 26.0 (SD = 4.0) and M = 14.9 (SD = 1.5), with a significant pre-post difference ($p \leq 0.001$); FTF was M = 24.5 (SD = 4.2) and M = 20.1 (SD =	*Effective of online technology (i.e. email) in delivering the HELPP intervention with the differences between baseline and post-test level among anxiety, depression, anger, PRQ (Personal Resources Questionaire) and ISEL(The International support Evaluation List) score. Online participants consistently gained significant improvements in outcome measures* *Online intervention may lessen social risks and inhibitions, enhances sharing of unwelcome thoughts and painful feelings.*

		16.2); WLC was M = 19.6 (SD = 8.7) and M = 24.5 (SD = 4.3), with a significant pre-post difference (p = 0.01).
		The depression pre-test score and post-test score from online intervention was M=26.4 (SD=5.0) and M=14.9 (SD=1.5), with a significant pre-to post-difference (p≤0.00); face to face was M=26.1 (SD=6.1) and M=25.2 (SD=6.1)
		The anger mean score pre-test to post-test difference was significant for ONL (p<0.001) and WLC (p=0.01).
		The personal and social support pre-test to post-test mean score differences were significant for ONL (p<0.001;p<0.001) and WLC(p=0.01;p=0.006),respectively.

6	Eden, et al (2015)	IPV	RCT	Measurement: Decisional conflict scale DCS The average DA score fell into the severe danger category with means of 14.36 (SD=7.73) and 15.85 (SD=4.77) for participants with a male and female partner, respectively. Intervention-group women had a greater reduction in total decisional conflict than control participants (β=-0.10, p=0.002; effect size =0.12) Intervention participants also had a greater reduction in uncertainty (β=-0.08, p=0.006; effect size=0.07) and feeling unsupported (β=-0.03, p=0.008;

				effect size=0.07). Abused women randomized to the safety decision aid reported less decisional conflict about their safety than those women randomized to the usual safety planning group.	
7	Ejaz, et al (2017)	Elder abuse	Feasibility study		*Three modules are provided online training, including background on abuse, screening of abuse, reporting protocol. Pre and post-test of knowledge tested. 8/12 (67%) of the questions demonstrated significant improvement.* *The only module without significant improvement in knowledge is screening of abuse. The training modules lack illustrations relating to various types of self-neglect (environmental, health-related, and behavioral)*
8	Glass, et al (2017)	IPV	RCT community-based	Intervention group women experienced significantly less	

		decisional conflict after one use (β= –2.68, P=0.042) and greater increase in safety behaviors they rated as helpful from baseline to 12 months (12% vs 9%, p=0.033) and were more likely to have left the abuser (63% vs 53%, p=0.008). Women who left the abuser had higher baseline risk (14.9 vs 13.1, p=0.003) found more of the safety behaviors they tried helpful (61.1% vs 47.5%, p=0.001), and had greater reductions in psychological IPV ((11.69 vs 7.5, p=0.001) and sexual IPV (2.41 vs 1.25, p=0.001) than women who stayed. The percentage of safety behaviors found helpful increased 12% in the intervention group, versus 9% for control

				(β=0.05, 95% CI=0.003, 0.097, p=0.037).
9	Goldman, et al (2019)	Child abuse	Convenience sampling	*Knowledge increased significantly in intervention group compared with the control group. Intervention group participants stated the app was easy to use (59%) and useful (63.9%) and preferred the CSEC information in the form of an app versus printed materials (85%).*
10	Gur, et al (2016)	IPV DV	Convenience sampling	*The GPS in DV is important in providing enhanced supervision (96%) and to keep victim safer (94%).* *The GPS in DV was important in allowing defendants to continue living in the community while awaiting trial (86%), while still offering agencies to monitor compliance with treatment (85%).* *38% were very satisfied with using GPS to monitor pretrial*

			defendants. *51% strongly agreed that GPS provides an opportunity to better supervise their clients.* *92% agreed GPS technology facilitated asking' hard questions and help guiding client's decision making (90%).*	
11.	Harris, et al (2009)	IPV	***The overall quality of the online CME program was rated highly (mean =4.52/5) [User satisfaction]*** *The average promotional cost per physician user was $75.* *Direct email was the most effective strategy.* *E-promotion via search engine advertising and e-mail solicitation had less reach but was more cost efficient ($30-$80 per user)* *Strategies with no direct cost like posting in*	

				professional newsletters, accounted for 31% of physician users.
12	Hassija, et al (2010)	DV	N/A	Measures: ***PTSD severity*** Participants' mean PCL (The Post-traumatic Stress Disorder Checklist) score was 32.20 (SD = 12.68). Using Cohen's d 39 to calculate treatment effect size, participants exhibited large reductions on PTSD symptoms (d = 1.17). ***Depression*** On the CES-D (Center for Epidemiological Studies Depression Scale), participants' post-treatment score was 13.07 (SD = 9.07), also indicating a large reduction in depressive symptoms (d = 1.24). ***Client satisfaction*** *Clients' reports of satisfaction with the provision of psychological services via videoconferencing on the WTTCCSS (The*

				Wyoming Telehealth Trauma Clinic Client Satisfaction Scale) *revealed very high levels satisfaction (M = 52.93, SD = 2.43)* The effect sizes were large for each group on PTSD and depression outcomes (domestic violence: d = 1.00, d = 1.33; sexual assault: d = 2.18, d = 1.05, respectively). *These results suggest that videoconferencing is an effective medium to provide specialized, evidence-based psychological services to rural domestic violence and sexual assault populations.*
13	Ibarra, et al (2014)	DV	Qualitative interview/comparative analysis	<u>US Midwest:</u> Defendants don't know the units enabled with GPS tracking, officers will have 'surprise' home visits to defendants and detect the presence of substances, weapons that might heightened the risk to the victim.

				South: Aim at building trustful relationship with the defendants. 'GPS is intervention, not punishment.' They do motivational interviewing to work with the clients, instead of forcing them to comply with the rules. West: GPS is used as a source of solace against the threat of false accusation. 'Teamwork approach' to share clients.
14	Jabaley, et al (2011)	Child abuse	N/A	Observation System: the Home Accident Prevention Inventory-Revised (HAPI-R) A significant decrease in the range of average hazards per room was demonstrated across families: 10–17 for Family A (74%), 1–5 for Family B (93%), and 0–9 for Family C(97%). Communication via

	iPhone was categorized into one of three categories: logistical, content question (initiated by the participant), or feedback (initiated by the home visitor). Logistical questions or reminders constituted the largest mode of communication across Families A–C (65%, 63%, and 53%, respectively). The mode communication by far was texting (86% average).	
	Reactions to the program and the iPhone enhancement were wholly favorable.	*Parents considered their homes safer and expressed confidence in recognizing and securing hazards.*

15	Lefever, et al (2008)	Child Abuse	Longitudinal study	Study 1: Higher parenting essentials associated with higher knowledge of child development, higher scores on the parenting styles measure, lower child abuse potential, and lower scores on the history of neglect measure.; *cell phone offers greater level of mobility and convenience at a lower cost than landline phones, therefore they were chosen for further study.* Study 2: (SEM) Parenting essentials coded from the interviews were significantly related to observed measures of parenting at age 4 and 8 months. *Cell phone is useful in intervening with mothers at risk of suboptimal parenting and child neglect.*
16	MacLeod, et al (2009)	Child abuse	N/A	The mean duration of the consultations was 71 minutes (range: 25–

				210 minutes). The consultations resulted in changes in interview methods (47%), the use of the multimethod examination technique (86%), and the use of adjunct techniques (40%). There were 9 acute sexual assault telemedicine consults that resulted in changes to the collection of forensic evidence (89%). Rankings of practitioners' skills and the telemedicine consult effectiveness were high, with 82% of cases scoring ≥5 on a 7-point Likert scale.
17	McAndrew, et al (2014)	Intimate partner violence	Quasi-experimental	· *The online tutorial was found to be effective in increasing the participants' perceived preparation, knowledge, and self-efficacy and*

				decreasing perceptions of provider constraints in managing victims of IPV.	
18	Paranal, et al (2012)	Child abuse	non-equivalent group design	**Individual's reaction to online training format:** Participants generated a mean score of 3.97 on thinking a live facilitator was unnecessary. A mean score of 7.08 when asked about the availability and necessity of recommended services/ resources. Mean scores were close to neutral (5.1) when participants were asked if they found the training to be emotionally difficult. Participants rated the training content(9.13) and found the training format interesting (8.88), useful (8.9) and ease of use above neutral (6.4). 80% of the participants viewed all the video clips. Negative comments mainly related to user-friendliness of the	

				training or registration difficulties, especially to those who are computer illiterate. **Organization reactions to online training:** The mean score of 7.6 for the easiness to administer to staff/volunteers. The mean score of 7.25 on preferring online training over other training methods. 5.75 mean score for indicating that organizations did experience technical problems with the training. *The training is believed to be effective in teaching adults about child sexual abuse with a mean score of 8.97.*	
19	Rothman, et al (2009)	Intimate partner violence	Convenience sampling	*· Having a current, working e-mail account was not rare among this sample of shelter residents* *· 4/5 of the survivors with e-mail accounts would*	

				not object to further contact from advocates following their departure from the shelter. *· 89% used e-mails in locations other than their own homes, 81% reported that their e-mail accounts had never been accessed by unauthorized dating partners and 88% reported that it is safe for the shelter to e-mail them.*
20	Sargent, et al (2016)	DV	RCT	**Knowledge about consequences and how to help children exposed to DV:** Time x Condition interaction was significant in both community and undergraduate sample in intervention group. **Self-efficacy to help children exposed to DV:** Time x Condition interaction was significant in the community sample of the intervention group, but not the undergraduate student group.

				Moderators of program effects: participant history of DV exposure and participant sex: 41.5% reported exposure to DV during childhood. No Time x Condition x DV/Sex Exposure interaction effect emerged for knowledge, self-efficacy. *· Online program is effective to reach large numbers of people inexpensively and quickly* *· Can raise public awareness of DV effectively* *· offer a cost-effective way* *· allow participants to move through the program at their own pace*	
21	Thraen, et al (2008)	Child abuse	Mixed methods		85% of the participants used desktop PCs on a regular basis

				and 28% used laptop PCs. 81% of the participants reported the ability to save and upload images from a Web browser. 72% reported the ability to download and install Web browser plug-ins. 55% of the participants had used e-mail for sharing child maltreatment medical/clinical assessments.
				The remote site had higher median than tertiary site in terms of 'creating case is straightforward', 'Making changes to a case is straightforward', 'Navigation clearly represented' and 'Output is accurate'

2.4 Discussion

Our study examined and synthesized research on the technology interventions, research designs, and reports on the overall state of DV technology (Table 4-5). The results shed light on the multifarious use of technological interventions for women experiencing violence. There were seven types of technological interventions leveraged for DV (e.g., web-based intervention, online training, mobile applications, emails, Global Positioning System (GPS), videoconferencing, and simulation), and most of the studies assess acceptability, usability, and participants' satisfaction. However, only a few studies measured psychological health outcomes including quality of life, stress, sleep quality, and emotional needs of DV victims.

Our result showed that HIT interventions targeted different types of abuse in a family. The most common type was intimate partner violence, while the least common was elder abuse. Literature showed that HIT interventions are easier to deliver to young and educated people in clinical and community settings, while the elderly are staying at home or are unwilling to use these health interventions due to perceived barriers, the inertia to learn without tailored guidance, and cognitive and physical disabilities (Jimison et al., 2008; Lober et al., 2006). However, this situation may diminish due to aging problems and an increase in computer literacy. The web-literate population grows and constantly surges with the increasing reliance on technology in our working and leisure lives. Over 89 percent of the U.S. population were internet users in 2019 (Internet World Stats, 2019). Fleming (2015) enunciated that over 60% of people older than 50 used technology to assess social networking sites, take photos, and send text messages. Although those older than 65 may experience more barriers to using health technology like hearing deficit, they will adopt new technology when the benefit outweighs the disadvantages. There has been a

proliferation of studies regarding the role of technology use in elder abuse, which indicated high accessibility, practicality, and feasibility to track the neglect or physiological changes among elder abuse victims in-home or clinical settings (Beach, 2017). For example, Beach (2017) examined the effectiveness of an audio computer-assisted self-interviewing (A-CASI) system among elder abuse victims, in which the computer interacts with the elderly victims with recorded questions and answers. Their results indicated approximately 70% of the older victims found it easy to use, with privacy protected, and preferred a technology-assisted system. Therefore, we expect that computer literacy and HIT interventions among the elderly will increase, and future interventions will expand to the elderly population with the aging trend in the coming decades.

Our results also found that the HIT has been applied to DV victims living in both metropolitan and rural areas. Specifically, technology interventions thrived in rural areas in the past decade. With the limited access to healthcare, transportation, and communication, women in rural areas suffering from DV cannot effectively deal with their situation (Orchowsky, 1998). In the past, victims from rural areas may not benefit from technological advancements and treatments due to limited support provided (Orchowsky, 1998). However, our review showed that digital devices in rural areas are promising in telemedicine and may provide an interactive way to deliver care, make referrals, and provide diagnosis and screening for DV victims who may not be able to travel to visit clinicians. As the digital literacy rate surged consistently over the past decade, it is expected that the constraints of technical support (i.e., limited wireless devices, unstable internet, limited access to technical assistance) are no longer the stumbling blocks for HIT interventions in rural areas. The current literature examined videoconferencing, interventions regarding medical appointments, counseling services, and danger assessments, which should extend to rural areas through digital devices. We expect that the reliance on teleconferencing and online counseling services will be more significant as more health insurance plans cover online services and consultations for the mental health of women experiencing DV.

Web-based and mobile health interventions are a growing trend for DV prevention and education. Six studies from our results adopted web interventions (Bloom et al., 2014; Choo et al., 2016; Eden et al., 2015; Glass et al., 2017; Sargent et al., 2016; Thraen et al., 2008), and three studies adopted mobile applications (Goldman et al., 2019; Jabeley, et al., 2011 and Lefever, et al., 2008). Sargent et al (2016) designed an online program (Change A Life) to educate individuals about children's exposure to DV and to increase individuals' self-efficacy in providing support to children exposed to DV. This study was effective in raising public awareness of DV and educating participants with strategies to help children exposed to DV. Glass et al (2017) also launched a website for educating the safety decision-making and decreasing decision conflict among DV victims. It is primarily designed to help survivors make informed decisions about their safety and well-being by raising their awareness of red flags and fatality risks in the danger assessment tool. The advantages of using web-based HIT are not only convenience and interactive design, but also the anonymous environment created by the Internet. Since victims or survivors of DV may refrain from face-to-face social interactions due to stigmatization, shame, guilt, and judgment (Tarzia et al., 2017), web-based interventions created an anonymous environment, encouraging the victims or survivors to tell their truth to researchers. The anonymity and sense of social distance created by technology also appear to facilitate sensitive discussions (Cantrell et al., 2007; Wharton et al., 2003). Effective patient-provider communication remains the linchpin of intervention outcomes, especially when concerning a sensitive issue like violence. These technologies have the potential to facilitate communication and interaction between abused victims and healthcare professionals.

Technology for DV was used not only at the patient level but also to train healthcare professionals. From our review, online training for healthcare professionals was another emerging trend in preventing DV. McAndrew et al (2014) initiated an online tutorial program that was effective in increasing the participants' perceived preparation, knowledge, and self-efficacy in managing victims of IPV. Free online Continuing Medical Education (CME) programs also

evaluated by Harris et al (2009), were successful in providing training on IPV intervention training online. In the future, intervention development can devote efforts to creating a compulsory module that can be developed for new nursing staff, social workers, or a counselor orientation program.

HIT intervention improved the physical and psychological health outcomes for women experiencing DV. For example, women suffering from DV found the technology intervention effective in raising their awareness of safety strategies, increasing their sense of safety protection, and their ability to protect themselves from abusers at home (Glass et al., 2017). Mobile applications and online training programs help measure the current danger score for women, thereby arousing their immediate awareness, and increasing their involvement in safety plan changes (Bloom et al., 2014). With technical assistance, women can be more actively involved in reassessing their danger scores and adjusting their contingency plans. Simultaneously, our studies showed that online platforms, emails, and messenger were effective in decreasing the risk of depression, anxiety, and PTSD (Bloom et al., 2014; Constantino et al., 2015). The technology provided a resourceful hub for women to share and discuss their conditions with each other; this aligns with previous studies which observed that computer-delivered intervention can improve social support, self-efficacy, and reduce loneliness among rural women(Weinert et al., 2008). As a result, HIT interventions can contribute to a better social support network for women experiencing DV.

We found that there were limited HIT intervention studies on assessing the emotional aspects of victims' experiences. Evidence is abundant about the importance of emotional health to female survivors of DV. Women reporting abuse were six times more likely to experience emotional distress (Ellsberg et al., 1999). In a sample of pregnant women who had IPV experience, the risk of emotional distress was 1.4 times higher for each additional episode of psychological violence and 2 times higher for each additional episode of sexual violence (Groves et al., 2012). Their results align with another observational study conducted by the World Health Organization

(WHO) at the multi-country level, which indicated that women with IPV experience a higher demand for mental health services and higher odds of psychological distress (Ellsberg et al., 2008). As such, it is common that women are more expressive and emotionally unstable after traumatic events. With the anonymity and instant communication allowed by mobile devices, women are more willing to seek emotional support via texting or express emotions via an online platform (Kivran-Swaine et al., 2012; Wolf, 2000). This allows for better adaptations and life improvements after traumatic events from abusive relationships. Future work endeavors can improve the emotional regulation of survivors, thereby promoting a better mental health outcome.

However, we need to be cautious when adopting technological interventions for DV. Several articles explain the shortcomings of using a technical device across the clinical, community, and household settings (Murray et al., 2015; Southworth et al., 2007). With the power and control theory of DV, Baddam (2017) believes that technology may worsen the epidemic of DV as abusers can install tracker applications with GPS and criticize the victims for hiding the DV-related applications in a smartphone. Perpetrators can easily become digital stalkers and threaten the victim, thereby posing a tremendous psychological impact on the victim's life (Melander, 2010). Additionally, participants' self-report to a tablet, smartphone, or web-based platform depends on their memory and willingness to share rather than the interviewing skill of providers. Long-term use of technology alone may hide the actual severity of DV and limit communication among victims and providers. Therefore, consultations or traditional interventions with technology are more sustainable.

In terms of the purpose of HIT interventions in the DV field, our results show that most of the interventions focus on communication, safety planning, and online training for healthcare professionals. Though these interventions are important to women with DV experiences, 80% of the DV victims and survivors are not willing to seek help through formal resources due to shame and guilt (Parvin et al., 2016). To provide adequate resources to women with DV experiences,

improving and exploring the help-seeking initiatives is necessary for this population. Thus, future interventions should explore how HIT could improve the help-seeking initiatives and understand help-seeking topics by exploring the conversations in online health communities and forums for the DV population.

Despite the surging popularity of social media platforms, leveraging social media as an official HIT intervention by authorities or organizations in the DV field is still in its infancy. With the anonymity and timely response given by social media platforms on Facebook, Reddit, and Twitter, there was a whirlwind of DV, or sexual violence advocacy campaigns that aroused public attention such as #metoo, #whyistayed, and #whyileft (Alaggia & Wang, 2020; Clark, 2016; Cravens et al., 2015). Most of these hashtag campaigns were triggered by a sexual abuse accident. DV victims and survivors empowered each other to speak up with a bottom-up approach. Therefore, these studies were mainly explorative in survivors' voices but did not evaluate the effectiveness of campaign implementation. With the surging demand for telemedicine and telenursing after the COVID-19 pandemic, using social media as an alternative HIT intervention by official DV agencies is poised to transform healthcare and nursing care for the better. Future research should explore the use of social media and examine the usefulness of leveraging social media to develop official HIT interventions in the DV field.

Implications for Research

HIT interventions have been mostly concentrated on raising awareness and creating a platform for women to communicate. However, most of the intervention evaluation is done at one time for pre and post-test assessment but does not consistently track long-term performance at different time points like 3, 6- and 9-months follow-up. It may be useful to utilize advanced data analytics like natural language processing to extract emotional needs and provide emotional support through virtual texting. However, there is no standard of measurement for measuring emotions via technology at this stage. Further research can leverage data analytics in building an

emotional term dictionary (e.g., resilience or distress) to provide a measurable standard to extract data and quantify content systematically.

Additionally, further research avenues should be devoted to phase II and III randomized clinical trials to assess the preliminary effect size, side effects, and efficacy of the technology in a specific setting. Most research in our review was in the design stage with assessing the feasibility and usability of prototype intervention. The next step should involve an initial test of intervention in comparison with an appropriate alternative option. A small RCT with a sample size of 40-60 should be introduced to identify outcomes and evaluate whether the measurement can detect the expected change, thereby generating effect size for the intervention (Gitlin, 2013). Future research can evaluate technological interventions by RCT in multiple sites or a targeted setting to assess the efficacy (Table 6).

Implications for Practice

This review also sheds light on the context and environment in which technology interventions are delivered in DV. There are ample web-based interventions, with theoretical and empirical evidence of their effectiveness and feasibility, to raise awareness, increase knowledge, and assess the case needs of victims. Using web-based interventions in outpatient departments, pre-and-post natal visits, and home visits is more effective than in other settings. The literature also suggests that victims also prioritize their needs during the family conflict, there is a priority of victim needs during the family conflict. Healthcare providers should be trained in addressing the common priorities of shelter, safety, law protection, child care, and problem-solving skills. Additionally, technical support in these areas should be provided to organizations and clinicians.

Implications for Policy

This public health issue cannot be fully addressed without policy change or adjustment. From a policy perspective, it is important to translate the research into clinical and community settings. According to the socioecological model, domestic violence prevention must occur at the

individual, interpersonal, societal, and community levels. The government and other concerned parties should support violence prevention research. More funding is recommended to advance care via technology. Moreover, our government should devise a policy to encourage a harmonious, respectful, and amicable environment in our families, workplaces, and communities.

The studies included in this review have methodological concerns regarding the sample size, demographic characteristics, and design. Sample sizes tended to be small, and many studies were pilot and exploratory studies. Although the settings include rural, urban, clinical, and non-clinical areas, the demographic characteristics are still dominated by a white population, which limited the overall generalizability of the outcomes. Since the location of the study was reported inconsistently, we categorized it into metropolitan and rural areas by using the current metrics from the U.S. Census Bureau (2016). There were only four studies that stated the inclusion of rural areas explicitly; future research should consider clarifying the definition or characteristics of locations where the interventions took place. This review excluded dating violence, as study participants may not be in the same family. We also excluded studies focused on male victims to compare the interventions in one sex.

Table 6. Implications for research, practice, and policy

Implications	
Research	▪ Evaluate at different time points ▪ Measure emotion condition ▪ Build ontology and leverage natural language processing to provide intervention ▪ Phase II and III trials (RCT) ▪ Multiple sites RCT
Practice	▪ Web-based interventions in outpatient departments, pre-and-post natal visits, and home visits are more effective than in other settings to reach potential women at risk for DV. ▪ Healthcare providers should be trained on DV screening like identifying women's needs for shelter, law protection, child care, and family conflict resolutions. ▪ Technical support should be provided to organizations and clinicians

Policy	▪ Translate the research into clinical and community settings. ▪ More funding is recommended to advance care via technology. ▪ Government should devise a policy to encourage a harmonious, respectful, and amicable environment in our families, workplaces, and communities.

2.5 Conclusion

DV is a widespread public health issue that engenders repetitive trauma under a vicious cycle. This review concluded that technological interventions can currently be applied to domestic violence. The reviewed literature demonstrates a vast heterogeneity in intervention modalities, target populations, and study designs. HIT interventions may reach underserved rural and suburban areas where there may be a lack of healthcare professionals. Participants were satisfied with reporting their abuse to providers via a technological device. Moreover, the HIT interventions on DV ranged from the patient level to the provider level. Online training modules applied to multi-disciplinary practitioners had promising results in the pre-and-post intervention tests. Although not all of the interventions measured physical health outcomes, the evidence suggested there is tremendous potential to harness technology in reaching a larger, more heterogeneous sample of participants. HIT can be leveraged for domestic violence survivors, regardless of the individual, family, practitioner, or community level.

3.0 Manuscript dissertation #2 (The help-seeking behaviors among women with domestic violence experiences expressed in online health communities.)

3.1 Introduction

Domestic violence (DV) is one of the most prevalent public health issues that threaten women's physical and mental well-being. DV refers to the physical, emotional, sexual, or financial abuse by an intimate partner or family members in a current or previous relationship (World Health Organization [WHO], 2013). In the United States, it is estimated that twenty people experience physical abuse by their intimate partner every minute (Black et al., 2011). Due to economic dependencies, childbearing responsibilities, and the stereotype that women are to protect the harmony of the family, they are more prone to feelings of guilt and shame if they need to separate from their children or intimate partner after the abuse (Scheffer Lindgren and Renck, 2008). Hence, women with DV experience disproportionally suffering from more severe mental health issues than men, such as depression and post-traumatic stress disorder (PTSD) (Jones et al., 2001). Moreover, DV is a sensitive topic that is rarely discussed in public and is deemed a private family matter. As such, the actual magnitude of the concern of DV is consistently underreported in the official reports.

As DV is a stigmatized public health issue, assisting women in need through the traditional screening method is particularly difficult. To encourage help-seeking among women with DV experience, identifying their help-seeking initiatives, needs, and struggles is the cornerstone of devising effective interventions for this vulnerable population. Several studies have explored women's help-seeking behaviors through interviews and surveys. For example, women tend to seek help and express DV experiences to their close friends and family members rather than formal departments like the police and legal and healthcare services (Parvin et al., 2016). This pattern is

observed in this vulnerable population and remains consistent in different cultural contexts (Johnson & Belenko, 2021; Paul, 2016; Muluneh et al., 2021).

Numerous positive results were reported after seeking help from informal networks, including the improvement in quality of life (Goodkind et al., 2003), self-worth (Orchowski & Gidyca, 2015), and intention to leave the abusive environment (Edwards et al., 2011; Edwards et al., 2015). However, the adverse outcomes of help-seeking can cause secondary victimization, such as victim-blaming and judgmental attitudes by close friends and professionals (Nagy, 2016; Powell, 2015; Thompson et al., 2016). Ahrens et al. (2007) also reported that secondary victimization or multi-victimization is the stumbling block of help-seeking initiatives among women with DV experiences. Therefore, providing high-quality feedback in a supportive environment is crucial to facilitating help-seeking initiatives with better health outcomes.

The Internet has been a platform for women with DV experience to seek help and express their experiences in an anonymous digital space, online health communities (OHCs), a platform that can be deemed as the one with the informal resources. Previous literature has explored the benefits of using OHCs for help-seeking by women with DV experiences. For example, Tanis (2008) found that the anonymity and disinhibited effect of OHCs allow those women to disclose personal stories without shame and fear of being judged by others. Moors and Webber (2013), delineated that victims turned to OHCs for help-seeking because they had nowhere to obtain support and believed that OHCs could provide a safer and highly accessible place with timely response to solve their urgent problems. Simultaneously, Gorissen et al. (2021), conducted a systematic review and indicated how victims of sexual violence seek support from OHCs for clarification, validation, unburdening, informing others, and thus providing a source of support to serve as a form of activism. Westbrook (2007) delineated the information exchange among women with DV experiences on OHCs and stated that women discussed with their peers' finance, legal,

mental health management, and logistics information. These works demonstrated that OHCs could be a valuable resource for seeking DV information.

However, OHCs are not a platform without potential risks and disadvantages. The anonymous environment in OHCs could catalyze the misinformation phenomenon, potentially generating myths, misconceptions, and misinterpretations of content for their users. Finn and Bannach (2000), viewed the misinformation on OHCs as victimization when it was purposively created. For example, if an OHCs member posts fraudulent content on a website, such as misleading information and ads containing images of sexual assault, women with DV experiences are vulnerable and easily annoyed by the content, which may lead to emotional distress and re-victimization. Another disadvantage is the victim-blaming and threats from OHCs. The disinhibited environment at OHCs allows users to express their ideas without taking responsibility, potentially leading to inappropriate and dangerous responses. Women with DV experiences are susceptible to stigmatization and minimization of the DV events after disclosing their experiences. The long-term consequences of repeated exposure to victim-blaming could exacerbate women's help-seeking initiatives (Whiting et al., 2019). As a result, it is crucial to evaluate the responses and suggestions from OHCs members.

Despite the surging of research leveraged OHCs, to examine the information exchange, topics discussed, and survivors' narratives in the DV population, the help-seeking behaviors, and advice types sought by women with DV experiences are unclear. The current help-seeking research in the DV field is mainly studied in formal and informal networks, while only one study has been conducted on OHCs with a focus on help-seeking behaviors among DV male victims (Sivagurunathan et al., 2021). Before deciding whether OHCs would be useful and reliable resources for women with DV experiences, it is important to explore the help-seeking situation in those OHCs. Therefore, the goal of this study is to explore the help-seeking behavior and what types of help were sought by women with DV experiences in the OHCs.

3.2 Methods

This is an exploratory, descriptive, and qualitative study that leveraged OHCs to explore the help-seeking behavior among women with DV experiences.

Data Source

To better understand the help-seeking behavior among women in OHCs, the data source of this study is Reddit, a well-known social networking site for information and experience sharing. A subreddit within Reddit refers to an online community dedicated to a particular topic that people write about, and they are denoted by /r/. According to Reddit, their members participated in over 80,000 subreddits (i.e., topically focused sub-communities) and generated over 80 billion views. There are numerous subreddits specific to a disease or cancer that can be considered as OHCs (Park & Conway, 2017). This study used subreddit (r/domesticviolence) as OHCs, which were about the information and support for DV victims, survivors, and their friends and family. This subreddit community (i.e., r/domesticviolence) was created in 2010 and had 20,000 members joined at the time of data collection.

We used Reddit for the study because this platform does not limit the number of words in the initial postings, which allows researchers to explore the detailed description of the help-seeking behavior of the users. Also, the subreddit of "r/domesticviolence" enables victims and survivors to interact and connect. Furthermore, Reddit permits pseudonym accounts and temporary accounts to protect the privacy of users, which encouraged victims to discuss sensitive topics and express their concerns candidly in the discussions.

Data Structure

Reddit's Application Programming Interface (API), which is also called the Python Reddit API Wrapper (PRAW) was used to retrieve data from the subreddit (i.e., r/domesticviolence). Data were crawled from 14 November 2020 to 14 November 2021. All the

personal information like usernames was deidentified. The data structure includes a newly assigned user ID, initial post title, initial post (content), comments, score (the number of upvotes minus the number of downvotes in the postings), and ups (the number of upvotes), and downs (the number of downvotes).

Inclusion and Exclusion Criteria

The inclusion criteria include posts related to women (aged 18 or above) with DV experiences who need advice on DV relationships or dealing with DV-related issues. Posts about non-abused women, women victims under 18, non-English posts, those sharing good news, gratitude posts without the need for any advice, and posts related to advertisement were excluded. To gain a deeper understanding of the help-seeking behavior of the original poster (OP), new variables were created to rank the postings for analysis (i.e., number of comments for the initial postings and number of times OPs returned). Since the subreddit community (i.e., r/domesticviolence) contains automatic chatbot comments for most of the domestic violence (DV) postings, we excluded them from our data analysis.

Data Analysis

Phase 1: Data Annotation

After screening the postings for analysis, the first author (VH) reviewed all the postings by reading the first thread and decided whether they met the inclusion criteria of this study. Postings were further ranked according to the number of comments, and the total number of times OP came back. A codebook was developed for systematic annotation between two nursing researchers. The initial codebook was built and developed based on an existing framework developed by Sivagurunathan et al. (2021), a study that examined help-seeking behavior among male DV victims on Reddit. Two nursing researchers (VH and JZ) annotated 50% of the data and discussed modifications to capture more help-seeking variables. The finalized version of the codebook was confirmed with domain experts in the DV field. This study included DV characteristics (i.e., types

of DV, types of abuse) and types of help-seeking (i.e., information, emotional support).

Phase 2: Reliability of the Coded Dataset

A detailed description of each concept was summarized in Excel spreadsheets. Researchers were required to highlight the clue for each annotation for quality checking purposes. Two annotators coded the complete dataset and met every week to discuss discrepancies. The final decision on any definition adjustment or unsolved discrepancies was made by the faculty-level researcher (YL). To ensure qualitative reliability, Cohen's kappa agreement was calculated by using the SPSS statistics software package (IBM Corp version 26, 2017)

Phase 3: Descriptive Analysis

To report the manual annotation result, the codes for help-seeking behaviors (i.e., information and emotional support), and DV characteristics were quantified with descriptive statistics (i.e., frequency and percentage). These variables are manually coded by a graduate student (VH) and an undergraduate student (JZ) from nursing school and verified by a domain expert in DV research (JC).

Phase 4: Thematic Analysis of Initial Postings

To understand the themes of help-seeking behaviors among women with DV experiences, initial postings were analyzed with the six steps of thematic analysis outlined by Brooks et al. (2015) and followed the Reddit qualitative thematic approach guidelines introduced by Caplan and Purser (2019). After randomizing the initial postings using excel software, two researchers read through the data carefully and familiarized themselves with the postings. Then, preliminary coding started with highlighting the text that is related to help-seeking, followed by grouping similar descriptions and building hierarchical relationships between broad themes and sub-themes. After developing the initial coding template, a total of two researchers independently coded for the remaining postings and look for new themes that are uncaptured. Discrepancies and new themes were discussed, and the themes hierarchies were re-organized accordingly. After confirming the

themes with DV domain experts, the first author applied the finalized themes framework to the full dataset. Also, it is noteworthy that each posting can elicit different types of help-seeking behaviors. Therefore, the themes and sub-themes were coded mutually inclusively.

Ethical Consideration

As our data on Reddit are restricted to publicly available posts and stripped of identifying personal information, the ethical approval for this study was determined to be exempt by the Institutional Review Board at the University of Pittsburgh.

3.3 Results

A total of 1,996 postings and 1,568 postings were selected as they met the inclusion criteria after the screening. Postings were further identified with the comments count, and if OP came back at least once. A total of 1066 postings were identified for relevance, while 502 were removed due to lack of comments and 314 were removed where OP returned to the thread less than once. Therefore, N = 250 postings were annotated manually and analyzed in the thematic analysis (Figure 8).

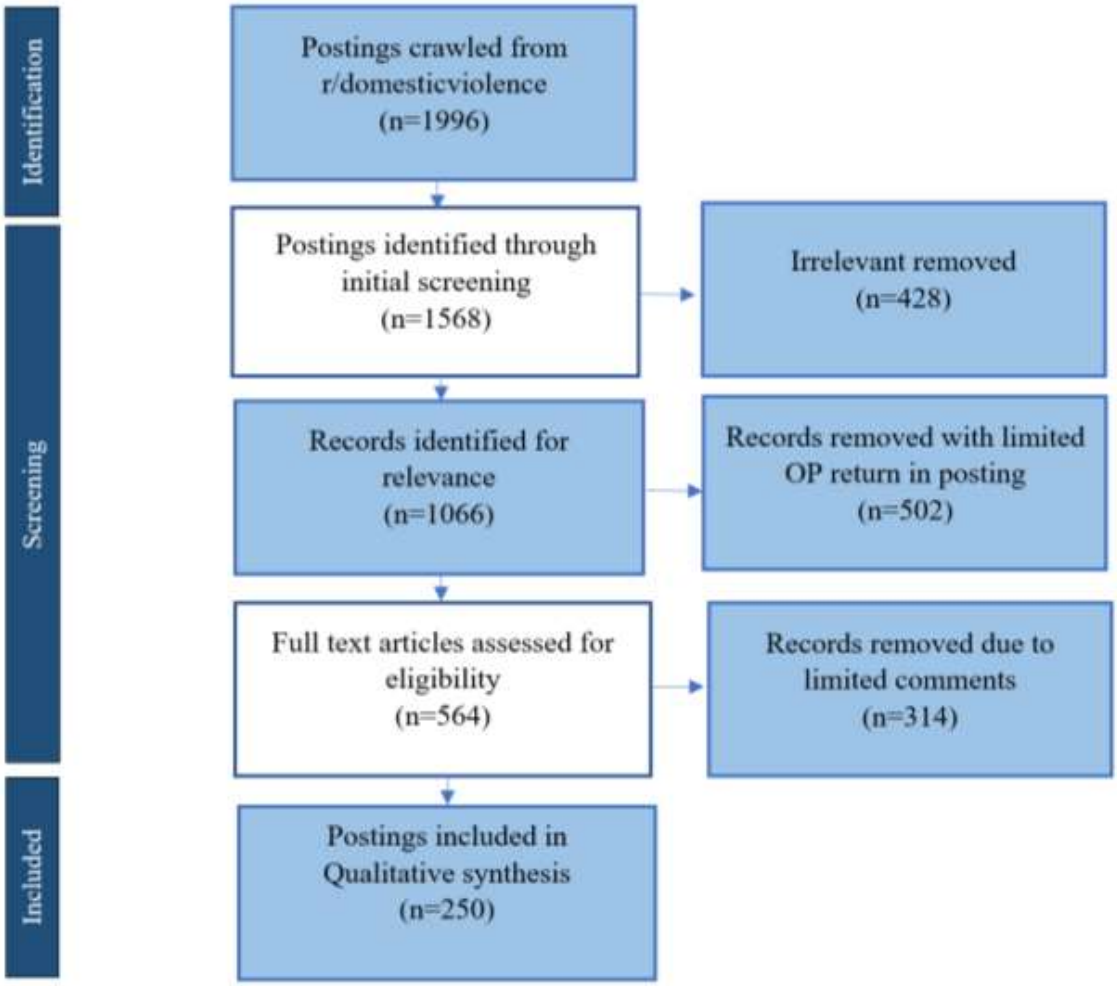

Figure 8. PRISMA flow chart of Reddit posting screening.

DV Characteristics

The most common types of abuse reported were physical abuse (N = 148, 47.1%), followed by emotional abuse (N = 36, 11.4%), sexual abuse (N = 109, 34.7%), and financial abuse (N = 21, 6.7%). Since perpetrators can inflict different types of abuse, multiple annotations for types of abuse were allowed in one posting.

Types of Help-Seeking

The sources of help sought by the OP were captured with information support and emotional support. The majority of the postings sought information support explicitly with clear information highlighted (N=172, 68.8%). The top three information help sought were DV knowledge (N = 43, 25%), legal (N = 21, 12.2%), and communication (N = 15, 8.7%), while the

most significant help being sought was general information advice (N=70, 40.6%). For emotional support, 36% (N = 90) of postings were annotated with the emotional support need (Table 7).

Table 7. DV characteristics and types of help-seeking in OHC (N=250)

DV characteristics	Frequency (n)/ Mean	Percentage (%)/ SD
Tyles of DV		
Abuse by parents/siblings	10	3.5
Intimate partner violence	**250**	**88.0**
Child abuse	4	1.4
Elder abuse	1	0.3
Not clear	19	6.7
Total	284	100.0
Types of abuse		
Physical abuse	148	47.1
Emotional abuse	36	11.4
Sexual abuse	109	34.7
Financial abuse	21	6.7
Total	314	100.0
Age*	24	(+/- 4.5)
Types of help-seeking		
Information support sought		
Yes	172	68.8
No	78	31.2
Types of help sought based on (n=172)		
Shelters/DV center/Agency	6	3.4
Legal	21	12.2
Childbearing	12	6.9
Police	5	2.9
Wound assessment/record	0	0.0
DV report procedure/Documentation	4	2.3
Safety Planning	14	8.1
Finance	7	4.1
Housing	4	2.3
Healthcare Information	5	2.9
DV survivors' network/Online support groups	3	1.7
DV Knowledge	43	25.0
Communication	15	8.7
Others – general advice	70	40.6
Others – pet	15	8.7
Miscellaneous	18	10.4
Emotional support sought		
Yes	90	36.0
No	160	64.0

*This variable is subject to a large amount of missing data.

Reliability of Coded Dataset

A substantial agreement between the two coders was achieved on the 250 sample posts (percent agreement = 85%, Cohen's kappa = 0.66) (Table 8).

Table 8. Cohen's kappa score based on DV postings (N=250)

Variable	Inter-rater agreement	
	Percent agreement	Cohen's Kappa
DV_Type	0.93	0.70
Abuse_Type	0.73	0.66
S_Info	0.72	0.64
S_Emo	0.72	0.45
R_info	0.97	0.80
R_Emo	0.90	0.45
Sharing	0.90	0.76
Offer	0.94	0.87
Average	0.85	0.66

Thematic Analysis

A total of five themes and ten sub-themes were generated from the (N = 250) initial postings. The name of each category and the themes were reviewed by all authors. Five main themes emerged, including (1) Recognition of the problem (n=57, 22.8%), (2) Advice-based help-seeking (n=98, 39.2%), (3) Emotional-based help-seeking (n=69, 27.6%), and (4) A forum for expression (n=50, 20%) (5) Explaining DV experience to others (n=15, 6%) (Table 9). A total of 10 sub-themes were found and described in Table 9.

Table 9. Thematic analysis on what types of help women sought in OHC.

Themes	Description	Examples
Recognition of the problem	N=57	
▪ Narratives of personal thoughts (Context)	Posters elaborate on the thoughts about the abusive experience and show signs to recognize the danger of DV.	"I know it's mostly all lies and intended to intimidate me, I know he is a bad person and abusive, I know I should leave for me and my kid's sake, I know I'll be happier once he is gone." "I guess what I'm trying to say is that I don't know how to feel right now because I know what he did was wrong and that it should never have happened." "Can he change? Will he change? Should I trust him again?"
- Self-blame	Posters wonder whether they were to blame for what happened to them.	"I feel like I was to blame." "I feel I'm to blame. I've had insecurities/trust issues this whole relationship, and apparently, me asking questions is yelling at him, and disrespecting him."
▪ Clarification/recognizing the situation by others (confusion) ▪ Trying to understand the situation	Posters were confused about what had happened to them and seeking clarification on whether the behavior is abuse, are they in danger, is it risky or not?	"Is it abuse?" "Is it still family violence if I let him abuse me before?" "Am I putting my kids in danger if I do not report him to the police?"
Types of help-seeking		
Advice-based	N=98	
▪ Seeking general advice	Asking for general advice, thoughts, or opinions.	"Any advice/help?" "I'm really struggling and really need opinions" "Any advice would be appreciated" "What do you guys think about it"

		"My head is spinning. Please help me understand what's going on."
▪ Next steps to move forward	Asking for the next steps to manage the situation and showing more helplessness.	"I don't know what to do." "I am just too helpless and afraid, I don't know what to do." "I don't know what to do anymore. I feel so alone."
▪ Seeking specific information support	Asking for any information support, or specific information.	"Where should I find the shelter?" "I'd like to find some counselor to talk to, what numbers I should call?" "How can I protect myself and my baby when escaping from home, should I find the daycare center or DV agency for help?"
Emotional based	N=69	
▪ Seeking emotional support	Asking for emotional support such as encouragement, empathy, understanding, and acceptance.	"I would appreciate it if somebody could send some encouragement my way, I cannot stop shaking and puking, I am a complete mess atm." "I'm just broken, can anyone relieve my worries and say something supportive to cheer me up?"
▪ Seeking peoples' understanding with similar experiences (Buddy feeling)	Asking if anyone reading had similar experiences.	"Just wanted to see if anyone has gone through the same experience" "I am also wondering if anyone of you who has also been through this had the same reaction as me?" "Can anybody relate to my experience?"
▪ Seeking emotional validation from others	Asking for emotional validation after experiencing violence to understand whether it is normal.	"I don't know what to do at that moment but I locked my child in the room for 3 hours when we were arguing, am I overreacting?", I feel so irritated and disappointed, but I feel like I still love him, am I too dumb? Is it common to

		feel like this?" "Is it okay to feel this way?"
▪ Healing and recovery	Asking for emotional support on how to bounce back from trauma, how to heal and get over it.	"How do I get over it?" "Why I am still stuck here, what should I do to heal myself from it?" "How can I move on from this abusive relationship?" "I am hopeless, what should I do to heal from it?" "I have no ideas when I can back to normal anymore."
A forum for expression	N=50	
▪ sharing emotions ▪ Just sharing experience	OP expressed emotional reactions they had from the trauma they experienced.	"I feel so angry, hurt, and confused." "I am so broken, physical and mentally, so overwhelmed with everything"
	The poster described the abusive experience because there is nowhere to help.	"I just want to vent here about everything I experienced." "I just want to type my story here coz I have no one to talk to." "I guess I'm writing this to actually just get it out. I feel lost."
Explaining DV experience to others	N=15	
▪ Communication ▪ Relationship	OP founds it difficult to explain their DV experience to others and seek communication/relationship tips with others (friends, common friends, parents, kids, etc)	"Our common friend does not trust me and we are not contacting for a few months after the incident, I do not know how to convince her, she is my best friend." "I just don't know how to talk with my kids about their abusive father, I tried to avoid a lot, I know I shouldn't but I don't know where to start"

		“Should I reach out to the new woman he is pursuing?”

3.4 Discussion

This study is the first study that investigated the help-seeking behavior among women with DV experience in an OHC. Using the latest help-seeking codebook for the DV population (Sivagurunathan et al., 2021), we found out that the most common type of help sought by women with DV experience was legal. About half of the women sought emotional support from peers in OHCs. The help-seeking behavior displayed in an OHCs includes recognition of the problem, seeking information and emotional support, and seeking a platform to express and explain DV experiences to others.

From our annotation, we found that DV knowledge was the most prevalent help sought by women in our data set. Women might want to understand the risks and evaluate whether their understanding of DV is logical and legitimate before seeking official help from police or healthcare providers. The virtual settings in OHCs may provide a platform to ask some DV foundation/ clarification making asking the questions easier than in a face-to-face clinical setting due to stigma and judgment by others. This result illustrates that the perceived DV knowledge among women who sought help from OHCs was relatively limited. While there is an extensive body of literature reporting the topics expressed among women with DV experiences in OHCs (Usher et al., 2021; Xue et al., 2020), little has been done to report on the demand for DV knowledge. Our study contributes to the empirical evidence and demonstrates that women with DV experiences would be interested to seek practical help with legal support and self-help in DV knowledge.

It is also noteworthy that legal information was the second-most prevalent topic of interest sought by women with DV experiences. Compared with the previous study, women from individualist western societies were more inclined to seek legal support and intervention than women from other cultural backgrounds (Li et al., 2013). Since our sample was mainly from English-spoken countries, women in our sample might seek legal support more than non-English

spoken countries. However, previous literature documented that most women did not seek formal help, especially legal and police intervention (Parvin et al., 2016) due to the fear of judgment and guilt. Since our data were collected from OHCs, it is possible that women may seek more clear instructions and learning about peers' experiences in OHCs before seeking legal help formally. Simultaneously, legal documents and procedures are bothersome and annoying to women after a traumatic experience. Baptista et al. (2015), reported abused women feared gender bias, lengthy criminal proceedings, high attrition, and low conviction rates from the legal procedures, which illustrated why they would prefer to seek help from others first in OHCs to avoid being emotionally overloaded from preparing the legal documents and fulfilling court commitments. Such findings further underline women with DV experiences high demand for legal-related information and support.

In addition to annotation, we found that women with DV experiences were eager to seek others' clarification in OHCs. Our thematic analysis results have shown that DV women victims were confused and felt lost as described in the initial postings. They used to describe the abusive experience first, followed by some questions to determine whether they are experiencing abuse or whether those behaviors count as red flags in DV. This elicits that women failed to recognize the red flags on their own and were confused about the DV definitions. Our result is consistent with Lyons and Brewer's (2021) work outcomes, showing that OHCs were a place to help victims clarify their situations and identify potential risky behaviors that threaten women's safety. For example, Moors and Webber (2013) examined women with DV experiences who prefer to talk more in OHCs as they were unaware of where to ask for help. Moreover, women could suffer from the "work from home" culture, quarantine, stay-home isolation, and limited social life during the COVID-19 pandemic (Boserup et al., 2020; Bradbury-Jones & Isham, 2020). Furthermore, women with DV experiences might turn to OHCs for problem clarification and identification.

Self-blaming was a common sub-theme identified under the categories of recognizing their DV problem in our analysis. Women with DV experiences often blame themselves first before seeking help, such as inability to fulfill the responsibility as an intimate partner, delayed communication after the first abusive experience by their partner, and failure in seeking help earlier. Our result is consistent with the previous study, which showed that women reported having self-doubt, self-blame, and feelings of worthlessness after psychological DV abuse (Whiting et al., 2012a). Though our study did not examine the relationship between DV characteristics and self-blame in OHCs, women tended to blame themselves for what happened to them and attempted to justify their abusive experience when they seek help virtually. Therefore, self-blaming could be one of the barriers to seeking help from formal in-person sources in this vulnerable population.

Another interesting finding from our analysis was that women with DV experiences were eager to inquire about the steps on how to recover from the trauma, regardless of multiple failures in trying to move on. Among the initial postings analyzed, those women reported the common difficulties to move on from abusive relationships such as trauma-bonding and guilt. The reactions to the difficulties they faced were either not sure what to do with hopelessness or actively seeking specific recovery tips. As such, OHCs provided a gateway for those women to ask about others' recovery experiences. Our findings were equivocal with previous survey studies reporting the women's ability to bounce back from traumatic experiences through resilience and self-advocacy (Murray et al., 2015). Although we did not examine multiple posts from the same user and trace their temporal effects on the recovery help-seeking process, our study is the first to report the demand for recovery in help-seeking among women with DV experience. Future research is needed to understand the temporal timeline of recovery help-seeking by tracing the same user accounts for a specific period.

Our study also showed that seeking emotional support was important to women with DV experiences. The emotional expression of help-seeking experiences found in OHCs reinforced the

emotional need among women victims. This finding echoed previous results showing the positive association between emotional support and DV (Hui & Constantino, 2021).

Moreover, emotional help-seeking was a common theme reported even in males with DV experience in OHCs (Sivagurunathan et al., 2021). DV is considered a sensitive and private matter traditionally. Victims from both genders felt more vulnerable when they describe their abusive experiences. Given that our study is the first to report the emotional need by manual annotations and thematic analysis in DV OHC, this could appear to suggest that OHCs may provide a platform for women victims to express their emotional needs with a timely response.

We also found that women with DV experiences were looking for emotional validation and seeking peoples' understanding of similar experiences. Women with DV experiences sought emotional validation from OHC members about whether their reactions could be considered normal. Gorissen et al. (2021) have documented the emotional validation in sexual violence populations on OHCs, however, no study identified emotional validation as a theme or an important factor in help-seeking behaviors specific to women with DV experiences on OHCs, yet. Moreover, these women preferred commenters to provide similar DV experiences from those who can resonate with them. Hurley et al. (2007) analyzed the online postings from domestic violence support groups and reported how the survivors learned the experiences of the other OHCs members and re-assess the seriousness of the abuse experienced by them. This may implicate that women with DV experiences want to be listened to, understood, validated, and supported emotionally, especially by someone who can resonate with them.

We also found out that women with DV experience leverage OHCs as a platform to express DV experiences and find a way to explain DV experiences to close ones. A significant number of postings elicited that women do not have a designated space to seek help and express their concerns. Previous studies proved that OHCs provide an anonymous environment that minimizes the shame and guilt from face-to-face conversations (Tanis, 2008). Moreover, Reddit allows users

to post DV experiences under throwaway accounts. This appears to suggest that women with DV experiences' personal information are being protected; therefore, they feel less anxious and less fearful about judgment and discrimination from others. When women suffer from shame and guilt after DV exposure, they are more vulnerable to talking with close family members, like kids and parents. As such, the anonymity from OHCs provided a safe platform for women victims and survivors to unload their emotions and seek help to figure out how to explain their experiences to others in a better way.

This study showed that many women with DV experiences are confused about their situations and failed to recognize the occurrence of abuse. Clinicians should assist victims in recognizing the seriousness of the DV problem by identifying the red flags and potential risks behind certain abusive behaviors. One of the main themes of using OHCs is to express emotions and experiences due to the lack of a secure place to unload these sensitive stories. Therefore, clinicians should encourage victims to express their stories first and followed by providing emotional validation to reassure the victims that they are being supported. If the consultation time is limited, clinicians are suggested to refer victims to seek help through OHCs like Reddit. However, as the comments from other users might be aggressive and selfish, clinicians should remind DV victims of the potential risk such as being emotionally overwhelmed by reading others' stories and drained by disrespectful comments. Victims and survivors should be reminded to take advice from whatever resonates and feels safe to follow based on their situation.

Although several clinical implications were derived from this study, using Reddit as the data source suffers from several limitations. First, this study is unable to capture the all the aspects of demographic information such as age, sex, education background, and income and explore the association between these demographic variables. Additionally, even though Reddit is publicly available for people from all around the world, most users are from English-speaking countries such as the United States, United Kingdom, Australia, and Canada. Thus, this study suffers from

geographical and language limitations. Our results should only be interpreted under the context of OHCs among women with DV experience. Apart from the data source limitation, the sample postings selected for this study are limited to 200. This could restrict the access and knowledge of other types of help-seeking behaviors in this population. For example, some postings related to the aftermath of DV are not coded in our studies, such as women victims turning out to be the abuser, the fear of gynecological visits, and transportation inconvenience in daily life. Since we stopped the codebook adjustment when the themes are saturated, we accept this trade-off given the purpose of this exploratory study. More importantly, this work served as a foundation to detect the help-seeking behavior automatically by computational algorithms in OHCs among DV populations.

In addition, we examined the agreement between annotators in the analysis. Despite the good overall Cohen's Kappa agreement reported, we realized emotional support agreement was relatively low compared to other variables. One of the possible reasons is the inconsistencies in emotional linguistic phrases used by posters, which undermined the agreement between annotators. Compared to information needs, the sentences expressing emotional needs are more ambiguous and lengthier. This result echoed other text mining studies in OHCs (Lee et al., 2022), and the machine learning model developed in this population (Trinh Ha et al., 2022). It could appear to suggest that extracting or annotating emotional linguistic features in OHCs might require more granularity in codebook development. Future research should investigate how to improve the emotional linguistic features extraction easier in OHCs.

3.5 Conclusion

The study contributes to a deeper understanding of the different types of help that are being sought by the women with DV experience in OHCs. Seeking emotional support, validation, tips

for moving forward, and skills to explain DV experiences to others were also commonly found in the OHC postings. As a result, OHCs served as a platform for women with DV experiences to seek help and express their emotions. Our findings contribute to the understanding of implications for designing better OHCs to support women in the DV community. In this study, only one subreddit community (i.e., r/domesticviolence) was selected for analysis. Several subreddit communities are related to the DV population, namely r/abusiverelationships, r/abusiveparents, and r/emotionalabuse. Therefore, future research needs to collect more data from different subreddits communities that were not included in the current study or could include and compare data from different OHCs, such as DV-specific, social media from the Facebook group, or Twitter, organization-based virtual platforms (i.e., advocacy groups/ non-governmental organizations). Furthermore, future endeavors should be devoted to analyzing whether OPs receive the support they sought in OHCs, and what postings could lead to more support received. This could improve the understanding of the types of victims that are being neglected in the OHCs and what factors are associated with the low response rate to their help-seeking posts. Although this study just included the initial postings from victims, future research could analyze the quality of the comments by recruiting victims/survivors to give some feedback on the types of advice that will be more useful and safer for them to make a better judgment to survive in an abusive environment.

4.0 Manuscript dissertation #3
(Examining supports and advice that women with domestic violence experience received in online health communities)

4.1 Introduction

Domestic violence (DV) is a thorny global public health issue. According to the statistics, between 2000-2010, 1 in 3 women had experienced physical DV in their lifetime (Desmarais et al., 2012). Women with DV experience disproportionately struggle more between economic reliance, childbearing responsibilities, and mental health issues arising from DV experience (Scheffer Lindgren et al., 2008; Johnson & Zlotnick, 2009; Jones et al., 2001). With the traditional female stereotype to protect the harmony and reputation of the family, suffering from DV is not comparable to any other type of health issue. As DV is deemed a private and sensitive family matter, women avoid help-seeking from formal sources to protect their family due to shame and guilt. As such, the magnitude of the DV problem amounted to underestimation in the public records.

Successful help-seeking attempts could improve the coping process, quality of life, and self-worth and expedite the process of recovering from their traumatic abusive relationship (Bennett et al., 2004; Frías, 2013; Goodkind et al., 2003; Orchowski & Gidyca, 2015). Previous literature identified that women with DV experiences sought help for safety planning, childbearing, health concerns arising from physical and mental abuse, and financial support (Satyen et al., 2018). Rather than seeking help from formal sources such as police and healthcare services, they preferred to seek help from informal sources such as close friends and relatives (Parvin et al., 2016).

As computer literacy grows under Internet 2.0, it is easier for people to seek help and express their emotions in a virtual space anonymously. Online health communities (OHCs), an anonymous platform designed for a specific group of people suffering from a certain disease or with certain public health concerns, may remove some barriers and stigma from in-person help-seeking experiences. Tanis (2008) reported that women with DV experiences could benefit from the anonymity and disinhibited effect of OHCs. They are more willing to express themselves and ask sensitive DV questions in OHCs. Moors & Webber further delineated that OHCs provided a safe, highly accessible, and instant response space for women with DV experiences to disclose their private matters publicly.

However, it is noteworthy that not all the help-seeking attempts and outcomes are satisfactory. Previous research demonstrated that women with DV experiences are susceptible to secondary victimization, such as victim-blaming and judgmental and skeptical attitudes by friends and police officers (Nagy, 2016; Powell, 2015; Thompson et al., 2016). OHCs have been criticized for misinformation and aggressive victim-blaming behavior in responses. In addition, OHC members took advantage of the disinhibited environment from OHCs by making irresponsible comments or giving unsolicited advice, like urging women with DV experience to leave the relationships or report to police without planning carefully, which may cause irreversible consequences like homicide (Whiting et al., 2019). Therefore, providing support and empowering encouragement in a non-judgmental avenue is crucial in facilitating help-seeking initiatives in this vulnerable population.

With the surge of OHCs available to DV survivors, it is important to evaluate whether the advice provided in OHCs is useful, reliable, and safe for women with DV experiences. Yet, we have little knowledge regarding the advice types and how OHCs users present their advice to women with DV experiences. We are also unclear how many women received the help they needed in OHCs and what types of help were mostly received. Without filling this knowledge gap, it is

difficult to determine the value of OHCs for women with DV experiences who are concerned about privacy and guilt during their help-seeking process. Therefore, this study aims to examine the type and pattern (i.e., communication style) of the advice given by peers in OHCs. Also, we explore whether their needs match the help that they receive from peers.

RQ1: What types of advice do the OHC give to women with DV experiences?

RQ2: What patterns of communications were presented by OHC members to build the credibility of the advice?

RQ3: How do women with DV experience receive the help they sought from OHCs?

RQ4: What types of needs were mostly received?

4.2 Methods

Study design

This study is descriptive, exploratory, and leveraged OHCs to explore the types of help received among women with DV experiences.

Data source

To understand the types of help received among women in OHCs, we crawled the data from a well-known social networking site called Reddit, a platform for information exchange based on different topics categorized in subreddits. This study collected data from a subreddit for women to seek help after the DV experience, r/domesticviolence. This subreddit community was initially created in 2010 and had over 20,000 members by the time of data collection. Compared with other OHCs, Reddit does not have a word limit in the postings and allows temporary "throwaway" accounts to protect privacy among users. Therefore, postings and responses are more comprehensive and detailed than other available OHCs.

Inclusion and exclusion criteria

All the posts related to adult women (i.e., age 18 or above) with DV experience who sought help to solve DV-related issues were included. However, postings about non-abused women, underage women, non-English posts, posts without help-seeking attempts, and advertisements were excluded.

To have a better understanding of the responses from OHC members, postings were ranked according to the number of comments and number of times the original poster (OP) returned. To fulfill the research goal, we excluded postings without comments and concentrated on exploring the comments patterns.

Data structure

Data were collected between 14 November 2020 to 14 May 2021. Usernames were deidentified and replaced with random user IDs. The data structure includes the post title, initial post, comments, score (i.e., the number of upvotes minus the number of downvotes in the postings), ups (i.e., the number of upvotes), and downs (the number of downvotes). In addition, the number of comments and times OP returned was manually created to rank the postings with the highest number of interactions between OHCs members.

Data analysis

Phase 1: Data annotation

Phase 1: Data annotation

The first author (VH) reviewed all the postings according to the inclusion and exclusion criteria. Based on the framework developed by Sivagurunathan et al. (2021), a codebook was created for systematic annotation. Two nursing researchers (VH and JZ) annotated the dataset, and two undergraduate students re-annotated randomly for quality check (ME and ML). Unclear and ambiguous postings were decided by the first author (VH) and verified by domain experts in

the DV field (JC). This study included types of help received (i.e., information and emotional), specific named information (i.e., DV agency, hotline, website, book, social media), networking offers, and experience sharing. (Appendix A, codebook)

Phase 2: Reliability of the coded dataset

Researchers were required to highlight the sentence for each type of help received in the excel spreadsheet for better quality check. Two annotators (VH and JZ) coded the complete dataset and met weekly to discuss discrepancies. Two other undergraduate annotators (ME, ML) rechecked the annotation and screened for discrepancies randomly. If annotators reported ambiguous postings without a clear definition listed in the codebook, the faculty-level researcher (YJ) decided on any definition adjustment or unsolved discrepancies. For qualitative reliability, Cohen's kappa agreement was calculated by using the SPSS statistics software package (IBM Corp, 2017).

Phase 3: Descriptive statistics

For the annotation results, the types of help (i.e., information and emotional), networking sharing, and experience sharing were quantified with descriptive statistics (i.e., frequency, percentage). A table list will be reported for the specific named information received in the postings. If the resources are provided more than once in our dataset, frequency numbers will be provided accordingly. All variables in annotation were manually coded by a graduate student (VH) and three undergraduate students (JZ, ME, and ML) from nursing and psychology schools. The final results are verified by a domain expert in DV research (JC).

Phase 4: Thematic analysis of comments

Comments were analyzed with the steps outlined by Brooks et al. (2015) to understand the themes of help-seeking behavior among women with DV experiences. The study followed

the Reddit qualitative thematic analysis framework introduced by Caplan & Purser (2019). Two researchers read through the randomized postings and highlighted the sentence for help-seeking, followed by grouping similar help-seeking into different hierarchical relationships. Discrepancies and ambiguous posts were discussed, and the hierarchies were re-organized accordingly. DV domain experts (JC and RC) verified the final thematic codebook and hierarchy. As the comments could elicit different types of help, multiple annotations and themes were coded mutually inclusively if applicable.

Phase 5: Matching needs

A dichotomized variable was created for counting the needs matched and unmatched to explore the linguistic features of help-seeking outcomes (i.e., matched needs or unmatched). Initially, four categories were created to operationalize matching needs. Matched needs, defined as the help requested, are matched with that support received, while unmatched needs, defined as the support received, are not matched with that requested help. Partly matched refers to the requested support being only partly matched with some types of help received. This condition applies to OP seeking multiple information needs but only receiving part of them. Broad coverage refers to the broad and general requested support and is matched with at least three types of support related to the OP's questions. After exploring descriptive data for matching needs, we collapsed all other categories into the matched needs segment, leaving unmatched needs as usual.

Phase 6: Analyze linguistic features of postings

In terms of linguistic data, all descriptive data of the initial postings were included, such as the number of upvotes, downvotes, scores, comments, links shared, words on the initial post, number of emoji used, and the sentiment score. In addition, we used the Linguistic Inquiry and

Word Count (LIWC) tool to analyze the score of different linguistic features, ranging from emotional affect, cognitive process, self-focus, perceptions, etc. All linguistic features were added to the basic descriptive data of each initial posting.

Phase 7: Statistical analysis

All statistical analyses were conducted using IBM SPSS (version 25, IBM Corp., Armonk, NY) with statistical significance assumed for p-values < 0.05. The matched needs and unmatched needs postings were compared based on each linguistic parameter included in LIWC and descriptive data using parametric and non-parametric tests. If variables fit the requirement of a parametric test, a t-test was conducted. In addition, Mann-Whitney U was used for variables that violated the normality and assumptions test to compare the differences between two groups (i.e., matched needs and unmatched needs).

Ethical approval

The Institutional Review Board at the University of Pittsburgh approved this study as exempt.

4.3 Results

A total of 1996 postings were crawled from Reddit, and 1,568 postings were selected to meet the inclusion criteria after initial screening. One thousand sixty-six (1066) postings were identified for relevance. After removing postings without comments and limited times OP had returned to the thread, N = 250 postings were annotated manually and analyzed in the thematic analysis (Figure 8).

Types of help-seeking received

The types of general help received were captured with information support and emotional support. 97.2% of the postings received information support, while 87.6% received emotional support (Table 10). Among the information support received, the top five common types of information help received were DV knowledge (n=414, 26.4%), DV shelter (n=242, 15.4%), legal (n=190, 12.1%), healthcare information (n=187, 11.9%), and safety planning (n=131, 8.4%). For emotional support, the top three were encouragement (n=570, 68.6%), empathy (n=174, 14.8%) and mutual understanding (n=159, 13.5%). Almost one-third of comments offered networking (n=74, 29.6%), while more than two-thirds of comments offered experience sharing (N=195, 78%). Specific named information including DV agency, hotline, website, book, and social media was displayed in Table 11, while website details were shown in Table 12.

Table 10. Types of help received among women with DV experiences in OHCs (N=250).

Types of help	Frequency	Percentage
Information support received		
Yes	243	97.2%
No	7	2.8%
Types of information help received		
Shelters/DV center/Agency	242	15.4%
Legal	190	12.1%
Childbearing	59	3.8%
Police	110	7%
Wound assessment/record	7	0.4%
DV report procedure/Documentation	77	4.9%
Safety Planning	131	8.4%
Finance	25	1.6%
Housing	37	2.4%
Healthcare Information	187	11.9%
DV survivors' network/Online support groups	32	2.04%
DV Knowledge	414	26.4%
Communication	17	1.1%
Miscellaneous	40	2.5%
Total	1568	100%
Emotional support received		
Yes	219	87.6%
No	31	12.4%
Types of emotional help received		
Love	77	6.5%
Empathy	174	14.8%
Mutual understanding	159	13.5%

Reassurance	114	9.7%
Acceptance	79	6.7%
Encouragement	570	48.6%
Total	1173	100%
Experience sharing		
Yes	195	78%
No	55	22%
Networking offer		
Yes	74	29.6%
No	176	70.4%

Table 11. Specific named information is shared among women with DV experiences in OHC.

Specific information	
DV agency	Women shelter DV shelters DV agency Local YWCA Counseling Support groups Freedom program in the UK Salvation Army Sarah's Inn in Illinois or contact Mujeres En Accion.
Hotline	0808.2000.247 DV hotline DV resource center hotline Try 211 and 800-799-7233 1 800 799 SAFE Trafficking hotlines 1.800.799.7233 (SAFE) — national DV hotline
Website	https://www.youtube.com/watch?v=V1yW5IsnSjo www.get-embrace.com https://knowitallnancy.com/know-it-all-nancy/blog/he-claims-hes-joking-its-really-verbal-abuse https://www.thehotline.org/resources/when-your-partner-threatens-suicide/ https://www.theduluthmodel.org/wheels/ https://ec.europa.eu/justice/saynostopvaw/helpline.html https://www.wave-network.org/wp-content/uploads/WAVE_folder180919_low.pdf https://www.healthline.com/health/relationships/cycle-of-abuse https://www.theduluthmodel.org/wheels/ https://www.familyrelationships.gov.au/parenting/children-family-law https://www.thehotline.org https://www.domesticshelters.org https://www.dvsas.org/

	https://wreg.com/news/study-domestic-abuse-victims-10-times-more-likely-to-be-killed-if-suspects-choked-them-in-past/ https://www.medicalnewstoday.com/articles/trauma-bonding https://www.healthline.com/health/relationships/cycle-of-abuse#the-cycle just google 'Domestic Violence therapist or psychologist https://www.alexandrahouse.org/virtual-support-groups-are-now-available/ google 'Domestic Violence Online support' Google 'Domestic Violence help near me' https://spotlightonwomenandviolence.com/2017/04/29/choking-seen-as-prelude-to-murder/amp/ https://www.nationaldahelpline.org.uk/ https://www.nationaldahelpline.org.uk/I-am-planning-to-leave-my-abuser https://www.nationaldahelpline.org.uk/Your-rights-and-options https://www.docdroid.net/py03/why-does-he-do-that-pdf https://www.thehotline.org/ https://archive.org/details/LundyWhyDoesHeDoThat https://www.ssa.gov/pubs/EN-05-10101.pdf https://www.texasattorneygeneral.gov/crime-victims/crime-victims-compensation-program/relocation-costs https://safehavensforpets.org/ https://hhs.texas.gov/doing-business-hhs/provider-portals/health-services-providers/womens-health-services/breast-cervical-cancer-services/bccs-client-eligibility http://www.buddhability.org https://www.strangulationtraininginstitute.com/strangulation-the-red-flag-of-domestic-violence-that-we-never-discuss/ https://www.sott.net/article/149774-Romeo-s-Bleeding-When-Mr-Right-Turns-Out-To-Be-Mr-Wrong http://www.bpddemystified.com/what-is-bpd/symptoms/ https://www.reddit.com/user/Up-Town/comments/9hv2yq/what_are_the_primary_warning_signs_for_bpd/ https://www.thehotline.org/ "abuse checklists" online https://www.domesticshelters.org/help#?page=1 https://www.washingtonpost.com/outlook/which-domestic-abusers-will-go-on-to-commit-murder-this-one-act-offers-a-clue/2017/11/16/80881ebc-c978-11e7-aa96-54417592cf72_story.html https://www.mobileodt.com/blog/taking-your-breath-away-why-strangulation-in-domestic-violence-is-a-huge-red-flag/?doing_wp_cron=1609123540.8453888893127441406250 https://www.strangulationtraininginstitute.com/strangulation-the-red-flag-of-domestic-violence-that-we-never-discuss/ https://www.lawyers.com/ask-a-lawyer/criminal/when-is-it-too-late-to-press-assault-charges-1566205.html http://www.hiddenhurt.co.uk/cycle_of_abuse.html

	https://breakthesilencedv.org/reactive-abuse-what-it-is-and-why-abusers-rely-on-it/ https://np.reddit.com/r/NarcissisticAbuse/comments/frbwl8/my_monthly_reminder_that_there_is_nothing_wrong/ https://np.reddit.com/r/NarcissisticAbuse/comments/iep08v/you_can_leave_a_toxic_relationship_but_if_you/ https://np.reddit.com/r/NarcissisticAbuse/comments/i3wv7y/i_left/ https://www.strangulationtraininginstitute.com/strangulation-the-red-flag-of-domestic-violence-that-we-never-discuss/ www.wbtv.com/story/37298199/cmpd-domestic-violence-abusers-who-strangle-victims-are-ticking-time-bombs-in-our-community/ https://www.reddit.com/user/Up-Town/comments/9hv2yq/what_are_the_primary_warning_signs_for_bpd/ https://www.sott.net/article/149774-Romeo-s-Bleeding-When-Mr-Right-Turns-Out-To-Be-Mr-Wrong http://www.bpddemystified.com/what-is-bpd/symptoms/ https://www.irs.gov/identity-theft-fraud-scams/get-an-identity-protection-pin https://www.thehotline.org/ https://freefinancialhelp.net/where-to-find-help-with-bills/ https://freefinancialhelp.net/ https://freefinancialhelp.net/domestic-abuse-assistance/ https://www.incharge.org/debt-relief/financial-help-domestic-violence-survivors/ http://www.auntbertha.com https://hotpeachpages.net/asia/index.html#Japan thehotline.org. https://www.docdroid.net/py03/why-does-he-do-that-pdf https://www.thehotline.org https://www.norfolk.gov.uk/safety/domestic-abuse/information-for-professionals/risk-assessment https://www.nationaldahelpline.org.uk/ https://www.ncdv.org.uk/ https://hollieguard.com/? https://www.healthline.com/health/mental-health/trauma-bonding psychologytoday.com http://www.abuseandrelationships.org
Book	Read "why does he do that" by Lundy Bancroft Try authors, Patricia Evans and Beverly Engel book on CBT

Social media	Youtube Reddit Youtube (LALATE) for community volunteers Reddit IG account for healing https://www.reddit.com/r/psychonaut/ r/narcissisticabuse r/NarcissisticAbuse https://www.reddit.com/r/offmychest/comments/lvt7w3/a_letter_to_my_son/?utm_source=share&utm_medium=ios_app&utm_name=iossmf https://old.reddit.com/r/domesticviolence/comments/jtzpg3/does_anyone_have_any_experience_with_domestic/ r/legaladvice Dr. Ramani on youtube Dr. Ramani's videos on YouTube about narcissists.

Table 12. Websites categorization

(1) General DV resources and support	(Broad and comprehensive resources with many types of informational and referral-based help, like websites with warning signs, hotlines, next steps, etc.)
Many types of help are available:	• DVSAS • psychologytoday.com • NCDV • (For victims in Japan): Asia: domestic violence information « HotPeachPages International
Hotlines/Live Chat/Virtual Support Groups:	• Domestic Violence Hotline • Non.No.Nein. Say No! Stop Violence Against Women • Virtual Support Groups Are Now Available - Alexandra House • National Domestic Abuse Helpline ○ I am planning to leave my abuser
(2) Crucial reads if you have been Choked or Strangled	(Choking/strangulation is a significant red flag and a warning sign for highly severe and potentially deadly abuse in the future → Consult the following sites for a better understanding of your situation—you are in serious danger.)
	• https://spotlightonwomenandviolence.com/2017/04/29/choking-seen-as-prelude-to-murder/amp/ • Which domestic abusers will go on to commit murder? This one act offers a clue. - The Washington Post • Taking your breath away - why strangulation in domestic violence is a huge red flag | MobileODT

	• Strangulation: The Red Flag Of Domestic Violence That We Never Discuss • www.wbtv.com/story/37298199/cmpd-domestic-violence-abusers-who-strangle-victims-are-ticking-time-bombs-in-our-community/ • Study: Domestic abuse victims 10 times more likely to be killed if suspects choked them in past | WREG.com
(3) Financial and Food Support and Shelter	(Websites to find and request material resources, like financial support, healthy meals, and shelter)
All three are available:	• FindHelp.org
Food:	• Supplemental Nutrition Assistance Program (SNAP) Facts
Financial:	• Relocation Costs for Crime Victims | Office of the Attorney General • Financial Help for Domestic Violence Survivors: Where to Get Help • Free Financial Help
Shelter:	• Search | Find Domestic Violence and Abuse Shelters • For pets: Safe Havens Mapping Project • DomesticShelters.org
(4) DV knowledge	(Guides that offer a description of a specific topic related to DV, like "reactive abuse," "trauma bonding," etc.)

Trauma bonding:	• Trauma Bonding: What It Is and How to Cope • Trauma bonding: Definition, examples, signs, and recovery
Reactive abuse:	• Reactive Abuse: What It is and Why Abusers Rely on It - Break The Silence Against Domestic Violence
(5) How and why does abuse happen?	(Background information about DV for people trying to understand why it happens and how the cycle unfolds, i.e. the abuser's motives and each stage of their abuse)
How: 1. Stages of abuse 2. What to look out for	Stages of abuse: • Cycle of Abuse: Understanding the 4 Parts • https://www.youtube.com/watch?v=V1yW5IsnSjo What to look out for: • WARNING SIGNS Abuse and Relationships • He Claims He's Joking But It's REALLY Verbal Abuse • Romeo's Bleeding - When Mr. Right Turns Out To Be Mr. Wrong -- Health & Wellness -- Sott.net
Why:	• https://www.docdroid.net/py03/why-does-he-do-that-pdf • Wheels - Domestic Abuse Intervention Programs
(6) Legal/Government-based Support	(Information regarding child custody, one's rights as an DV victim, pressing charges against abusers, and other legal protections that can help)

	• Children and family law • Your rights and options | Refuge National Domestic Abuse Helpline • Get An Identity Protection PIN | Internal Revenue Service • When is it too late to press assault charges? | Lawyers.com
(7) Emotional support	(Resources to help DV survivors find courage, hold onto their hope and recover from their emotional wounds)
	• buddhability • https://np.reddit.com/r/NarcissisticAbuse/comments/frbwl8/my_monthly_reminder_that_there_is_nothing_wrong/ • https://np.reddit.com/r/NarcissisticAbuse/comments/iep08v/you_can_leave_a_toxic_relationship_but_if_you/ • https://np.reddit.com/r/NarcissisticAbuse/comments/i3wv7y/i_left/
(8) Miscellaneous	
	• BCCS Client Eligibility | Texas Health and Human Services • (BPD symptoms): http://www.bpddemystified.com/what-is-bpd/symptoms/ • (BPD warning signs): What are the primary warning signs for BPD? : u/Up-Town • (Risk assessment tool for professionals working with victims of DV): DASH risk assessment - Norfolk County Council • (safe-guarding/safety app for mobile devices): Hollie Guard

Thematic analysis

A total of seven themes and 15 sub-themes were generated from the N = 250 postings' comments. All authors reviewed the name of each theme and sub-themes. Seven main themes emerged, including (1) Experience sharing, (2) Emotional empowerment, (3) DV knowledge display, (4) Advice type, (5) Clarification of scenario, (6) Networking offer, (7) Daily self-care tips. The 15 sub-themes that were found are described in Table 13.

Types of help matched

Figure 9 shows that 80% of women with DV experience received the help they sought from OHCs. Figure 10 shows 13 types of help annotated with matching help: wound documentation was the only one excluded as no women sought it in their postings. The top two information need matched were legal (90%) and DV knowledge (86%). For emotional support, 92.5% of postings successfully matched with emotional help when OP requested in the initial posting. However, some information help was less likely to match with what women sought in OHCs, including DV survivors' network (33%), healthcare information (48%), housing (50%), communication (53%), and finance (57%).

Table 13. Thematic analysis to explore the help received by women with DV experiences in OHC

Experience sharing	
▪ DV experience	E.g., If I may.. the longer you stay, the more danger you are in. There were a few times when my mom was very close to being killed. It took many years of abuse to reach that level of violence but each occasion only escalates to a more dangerous level.
▪ DV agencies/ Shelters experience	E.g., I volunteer for an agency that has a shelter, but most of our clients do not live in the shelter. We have staff therapists, a support group, a legal advocate, and victim advocates. Perhaps these folks you have been talking to can steer you toward help that doesn't involve staying in the shelter. E.g., Domestic violence hotline or support center will never tell you what you have to do. Instead, they get you a safety plan, they tell you what resources they have. They may even help you with groceries or any services they offer to relieve the financial burden caused by the abuse. As everyone else says, it seems difficult but you do have some options. The problem is that you are probably going to have to be relentless in your efforts to get to them.
▪ Emotional torture from Legal/shelters	E.g., Shelters don't accommodate many disabilities. There are a plethora of issues with shelters, but they won't kill you. Please work with DV services to make a safety plan.
▪ Ineffective counseling therapy	E.g., If you suspect at all there is abuse here (and you are posting in a DV sub, after all) it is never recommended to go to couples counseling with an abuser. Not only is it pointless, couples counseling generally focuses on communication. Abuse is not a communication problem. Many couples therapists are not well trained even in spotting abusers let alone treating victims. Therapists are not all the same. And abusers will often manipulate counselors into essentially helping them target you as the problem. Even if that were the case, abusers do not go to couples counseling to resolve the issue. They go to appease you to keep you in place to abuse, to listen to your feelings about when you were hurt by them, about what you want, etc all to be more effective in abusing you. They learn and misappropriate the language to use that against you as well. What they never do is go to a counselor and suddenly have a realization that they are abusive and make a complete change in their personality and behavior and even their way of thinking.

▪ Experience with Police	E.g., Calling the police is Russian roulette, it depends on who deals with it. You could get a survivor of domestic abuse who does everything that they can, it could be someone who just doesn't get it or doesn't care. It also depends on how busy they are at the time if the victim feels comfortable opening up fully and if there is enough evidence in your case. What area of the UK are you in? Different areas have different policies and risk assessments for example some use DASH. Google your areas and do it honestly and see what you come out as. Don't hold back, be honest. With a high-risk assessment you're entitled to more support from the council, social services, fire service, and police but IME sometimes you need to force the risk assessment on them and bang a lot of doors to get help.
Emotional empowerment	
▪ Reassurance	E.g., He was being aggressive, threatening, and intimidating. Even though he took his frustration out on inanimate objects you felt unsafe around him. Your decision to leave based on this is perfectly justified. You need no further reasons than that to know you have done the right thing for your safety and future happiness.
▪ Empathy	E.g., I am sorry that happened to you E.g., Please know that you are not alone. Some of us know the struggle, all too well.
▪ Positive vibes and faith	E.g., I'm confident in you and your choices, that you can do what is best and future-you will look back with thanks for your decisions and actions, even the hardest ones.
▪ Validation	E.g., You have the right to feel safe. You have a right to feel however you feel. E.g., You are not an asshole. You are a human being that has not been treated like a human being. It sounds like you have conflicting emotions. That is perfectly normal. Don't beat yourself up because of conflicting emotions.
DV Knowledge display	
▪ DV terminology and types	Trauma bonding PTSD Borderline personality disorder (BPD) Gaslighting E.g., Gaslighting is a strategy that can leave you deeply uncertain about your memory and judgment. That confusion and doubt is then what abusers take

	advantage of: they can then totally shape a survivor's reality E.g., When an abuser tries to strangle someone in a domestic assault, it is a leading indicator that he will escalate his attacks and eventually kill his victim, says Gael Strack, a former prosecutor and founder of the Family Justice Center Alliance, which helps abuse victims. E.g., Please do not discount abuse just because it is not physical. Look up emotional and mental abuse too, it's extremely damaging, but often starts so subtle it will take you years to see it.
▪ DV statistics /evidence-based knowledge	E.g., In the United States, victims who have been strangled are 750% more likely than other victims to be killed. Unfortunately, leaving is the most dangerous part. E.g., Statistically leaving is the most dangerous time and now he knows it's over and that she's leaving. I don't see him giving in so easily. He has threatened to have her killed if she leaves. I'm super concerned for the OP's welfare. E.g., A 2008 study in the Journal of Emergency Medicine found that 43% of women who were murdered in domestic assaults and 45% who were victims of attempted murder had been choked in the past year by their male partners."
Advice type	
▪ Directive style	E.g., GET OUT NOW! Leave, and don't look back! E.g., You have to leave now! He will kill you. E.g., please call 911 and report his ass, not only did he physically assault you, but he also raped you. This isn't worth going through like some of the other comments, forget the car, forget the money, forget physically possessions, your life is in danger! Call your sister and explain to her the situation, maybe you two can stay at another family member's house or motel meanwhile. Contact the police and get a restraining order. I hope so much you can get away...no one deserves to go through this hell E.g., If you go back, he will eventually kill you. I'm convinced of this. These types of people prey on us because we have no self-esteem. And once they have us, they

	rip shreds through whatever we have to make sure we don't leave and stop ya ding over cash, doing their Lau dry, etc.
▪ Emphasizing the empowerment and advice	E.g., I read in one of your comments that you have a family the next state over - if you can, start to make a plan to leave for there. If you have access to computers at work, google DV organizations there. Make the calls from there. If you have to use your phone, perhaps consider clearing the "past hour" of history if you've had to do any leaving-related searches. Hide all your important documents. E.g., I understand what you've been through, please take good care of yourself first and consider the seeking help from close friends or your sisters. Record all the wound condition with your phones and share the location with friends to protect yourself. Trust yourself, you can do it.
Clarification of scenario	
▪ Safety-related Warning signs identification	E.g., The level of escalation is a WARNING SIGN shouting to strangulation means flee ASAP. On the lethally test this rates 120/140 points! It's time to go~>~>~> usually this means your parenteral will murder you in the next 3-6 months. E.g., This is a red flag. Do not ignore it. Learn from others. Be safe.
▪ Self-blame related	E.g., His reaction to your disagreement is completely out of line. It's not your fault. At all. You didn't cause the argument. You're allowed to have different views from him. You didn't cause him to look up disturbing images. He chose to react inappropriately to a minor disagreement. He chose to send you threatening messages and a disturbing, sick image. E.g., The first thing to remind yourself is it is 100%, not your fault. Your abuser made their shitty choice and the burden is theirs to bear. So you didn't make or let yourself go through anything. Forgive yourself for being so close to the situation you didn't see it bc it didn't happen overnight. it was gradual.

Networking offer (OP & introduce others)	E.g., Please pm me if you want someone to talk to. E.g., I am trying to address two things here...one is to offer a couple of potential solutions for you (they may or may not be helpful to you and from what you've written, it is clear there is much more that needs to be addressed, but there is only so much I can reply here right now), the other is to assure you that your response and feelings are fine. There is nothing wrong with you for feeling the way you do.
Daily self-care tips	E.g., Take time to pamper yourself, color your hair, gym, sell unused, unwanted stuff on eBay, if you're crafty make & sell stuff on Etsy, walk dogs, do shopping for elderly neighbors, put money in your pocket, & can break the mundanity of your days, change your mindset, do not put weight in his words when he's being, particularly arseholey -if it's safe to wait till he's finished & ask if he's feeling better now E.g., upskill & do online courses, start meditation, listen to podcasts, if he yells at you or tells you who or what you are, ask why if he could do better he hasn't? do not get in a car with him unless it's absolutely necessary & make sure you're visible, if you're arty or crafty make & sell things on Etsy & lots of people find knitting, and crocheting calming. blog everything online with pics, join a church support group & a support group for people with your health conditions.

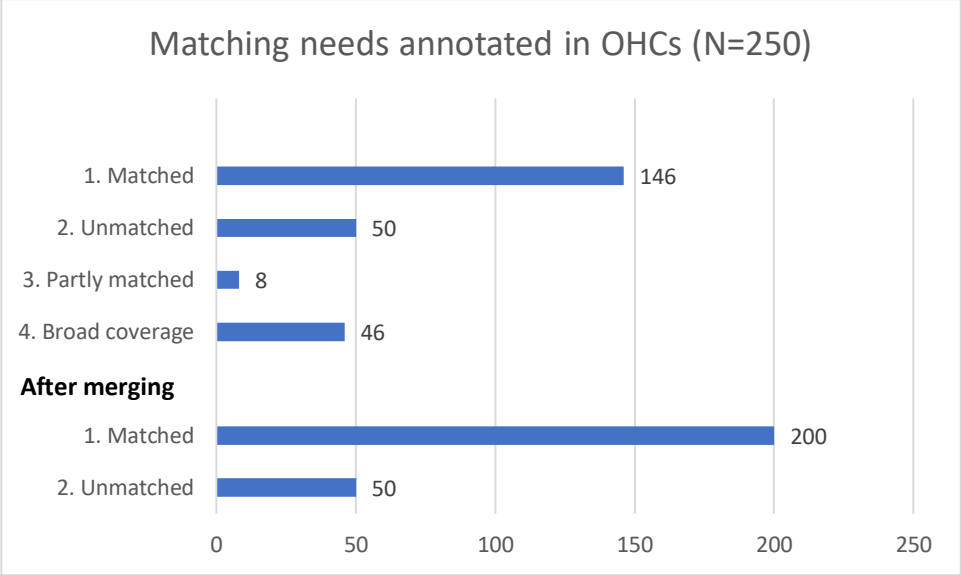

Figure 9. The number of postings received the needs they sought in OHCs.

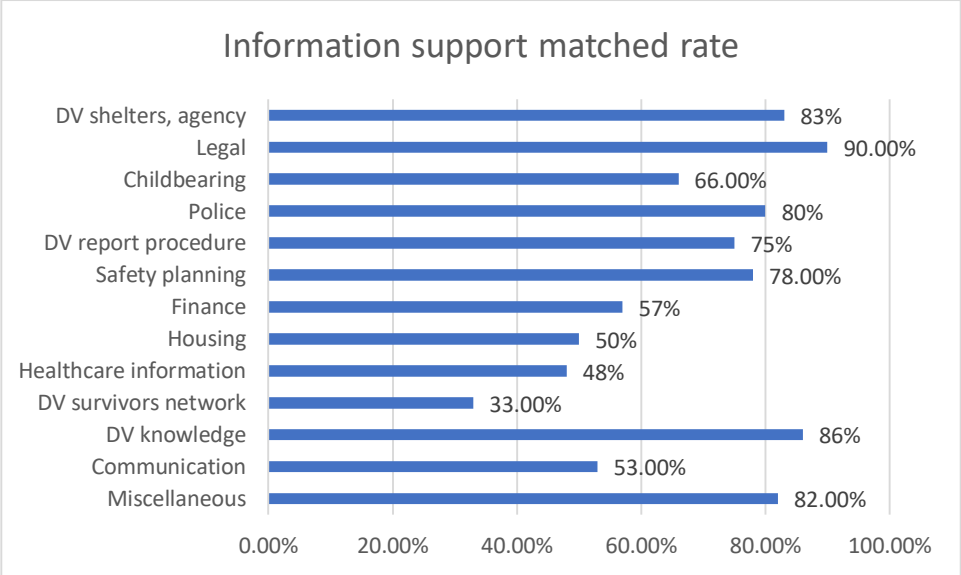

Figure 10. The help-seeking matched rate in different types of information help.

LIWC analysis and statistical tests

We also examined the use of 93 prespecified dictionaries (lists of words) from the Linguistic Inquiry and Word Count (LIWC) software (2015) that is widely used in health research. Table 14 shows the descriptive characteristics of posting features from annotated data and linguistic features from LIWC tools (N = 250). Table 15 displays the linguistic and postings features by two groups (i.e., matched help and unmatched help). Each post-sentence contained 298

words on average. Among 250 initial postings, 3 postings and 15 linguistic features were found significantly different between two groups, including number of comments ($p < 0.001$): number of words in comments ($p = 0.05$), title sentiment ($p = 0.05$), culture (e.g., car, united states, govern, phone) ($p < 0.001$), politic (e.g., legal, court, law, congress)($p = 0.003$), technology (i.e., wifi, computer, phone) ($p = 0.001$), politeness (E.g., thank you, please, thanks) ($p = 0.049$), health (E.g., medic, patients, physician, health) ($p = 0.023$), wellness (E.g., healthy, gym, exercise, diet) ($p = 0.047$), emotional anxiety (E.g., worry, fear, afraid, nervous) ($p = 0.044$), lifestyle (E.g., work, home, school, working) ($p = 0.027$), leisure (E.g., TV, cook, chat, fun, play) ($p = 0.048$), home (E.g., home, lawn, room, furniture) ($p = 0.006$), work (E.g., work, school, working, class) ($p = 0.004$), conversation (E.g., yeah, oh, yes, okay) ($p < 0.001$), netspeak (E.g., I know, u, lol, haha) ($p = 0.005$), and assent (E.g., yeah, yes, okay, ok) ($p = 0.004$). All other linguistic and postings variables were statistically insignificant between the two groups.

Table 14. Descriptive statistics of postings features from annotated data and linguistic features from LIWC.

Linguistic and posting features	N		Mean	Std. Deviation
	Valid	Missing		
SCORE	250	0	13.44	12.271
COMMENTS	250	0	13.29	7.830
OP_BACK	250	0	4.68	3.727
COMMENTS_WORDS	250	0	1678.42	1090.025
TITLE_SENTI	250	0	-0.02432	0.398402
LINKS_SHARED	250	0	0.54	1.311
EMOJI_USE	250	0	1.26	2.519
WC	250	0	298.16	258.173
Analytic	250	0	13.9256	12.95216
Clout	250	0	22.3234	25.50809
Authentic	250	0	70.8358	28.67174
Tone	250	0	13.3402	18.81036
WPS	250	0	19.7062	20.71271
BigWords	250	0	13.7319	3.87213
Dic	250	0	95.1386	2.56553
Linguistic	250	0	78.4629	4.43366
function	250	0	63.4663	4.31360

pronoun	250	0	22.2720	3.76128
ppron	250	0	17.0408	3.76118
i	250	0	10.0034	3.63916
we	250	0	0.7004	1.09975
you	250	0	0.6134	1.59277
shehe	250	0	4.8112	3.28658
they	250	0	0.7352	1.27089
ipron	250	0	5.2312	2.25085
det	250	0	12.1325	2.82143
article	250	0	4.4069	1.76788
number	250	0	1.7926	1.83053
prep	250	0	12.6127	2.82424
auxverb	250	0	11.0274	2.90633
adverb	250	0	7.0742	2.79379
conj	250	0	8.1089	2.37735
negate	250	0	2.4030	1.51127
verb	250	0	21.4061	3.87598
adj	250	0	4.9379	2.13953
quantity	250	0	3.3817	2.09741
Drives	250	0	5.1184	2.34282
affiliation	250	0	2.2476	1.84850
achieve	250	0	0.7126	0.68629
power	250	0	2.1769	1.66044
Cognition	250	0	14.6433	4.44943
allnone	250	0	1.5120	1.29135
cogproc	250	0	13.0515	4.28975
insight	250	0	3.0771	2.13460
cause	250	0	1.9744	1.75982
discrep	250	0	2.2550	1.53890
tentat	250	0	2.5746	1.86803
certitude	250	0	0.6074	0.71541
differ	250	0	3.9800	1.80895
memory	250	0	0.1056	0.38737
Affect	250	0	6.5066	3.30824
tone_pos	250	0	2.0817	1.66897
tone_neg	250	0	4.1064	2.87809
emotion	250	0	2.4544	1.95410
emo_pos	250	0	0.5919	0.96446
emo_neg	250	0	1.6508	1.57245
emo_anx	250	0	0.3867	0.65679
emo_anger	250	0	0.3841	0.70168
emo_sad	250	0	0.2369	0.47847
swear	250	0	0.1442	0.31708
Social	250	0	14.7187	4.49660

socbehav	250	0	4.8725	2.42287
prosocial	250	0	0.8116	0.96991
polite	250	0	0.3540	1.46479
conflict	250	0	0.6875	0.76220
moral	250	0	0.3005	0.51449
comm	250	0	2.3152	1.59990
socrefs	250	0	9.7360	3.66506
family	250	0	0.9283	1.32265
friend	250	0	0.2362	0.48328
female	250	0	1.1032	2.21731
male	250	0	4.4830	3.15591
Culture	250	0	0.2740	0.59573
politic	250	0	0.0136	0.07159
ethnicity	250	0	0.0042	0.03199
tech	250	0	0.2580	0.58834
Lifestyle	250	0	1.7396	1.62176
leisure	250	0	0.1520	0.34217
home	250	0	0.4164	0.62196
work	250	0	0.7970	1.03948
money	250	0	0.3687	0.80147
relig	250	0	0.0773	0.22664
Physical	250	0	2.3566	2.11059
health	250	0	0.9444	1.16968
illness	250	0	0.1423	0.35354
wellness	250	0	0.0719	0.32772
mental	250	0	0.2551	0.67076
substances	250	0	0.0580	0.23703
sexual	250	0	0.1534	0.46128
food	250	0	0.1646	0.39424
death	250	0	0.1093	0.27387
need	250	0	0.5839	0.86424
want	250	0	0.5376	0.86970
acquire	250	0	1.1160	1.15236
lack	250	0	0.1405	0.41706
fulfill	250	0	0.1058	0.26024
fatigue	250	0	0.0616	0.19315
reward	250	0	0.0322	0.19078
risk	250	0	0.4608	0.67145
curiosity	250	0	0.2047	0.54564
allure	250	0	7.4751	2.59223
Perception	250	0	8.8035	3.09869
attention	250	0	0.2770	0.56589
motion	250	0	1.8872	1.39352
space	250	0	5.4032	2.44775

visual	250	0	0.4926	0.81393
auditory	250	0	0.3004	0.67900
feeling	250	0	0.8938	1.12662
time	250	0	5.2762	2.35231
focuspast	250	0	5.6768	3.17741
focuspresent	250	0	6.5197	3.04405
focusfuture	250	0	1.4866	1.44844
Conversation	250	0	0.4847	0.85439
netspeak	250	0	0.3760	0.79010
assent	250	0	0.0987	0.36735
nonflu	250	0	0.0126	0.07642
filler	250	0	0.0270	0.13733
AllPunc	250	0	15.2955	5.02084
Period	250	0	5.9239	2.72629
Comma	250	0	2.9441	2.38452
QMark	250	0	0.9556	1.68932
Exclam	250	0	0.0992	0.33467
Apostro	250	0	3.3066	2.25934
OtherP	250	0	2.0654	2.60723

Table 15. Statistically significant variables of Linguistic Inquiry and Word Count categories with help-seeking results (i.e., matched needs v.s. unmatched needs) in OHCs (N=250)

Features	Matched needs		Unmatched needs		Mean difference (t/ M-W)			
Posting features								
	M	*SD*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*
Number of comments	**14.08**	8.45	10.14	2.98	3.243	248	<0.001	0.513
Number of words in comments	**1732.01**	1146.03	1463.84	803.16	1.561	248	.05	0.247
Title sentiment	-0.05	0.41	**0.07**	0.32	1.561	248	.05	-0.315
Linguistic features								
Culture (E.g., car, united states, govern, phone)	**0.31**	0.65	0.12	0.23	2.074	248	<.001	0.328
Politic (E.g., legal, court, law, congress)	**0.02**	0.08	0.00	0.00	1.510	248	.003	0.239
Technology (E.g., Wifi, computer, phone)	**0.29**	0.64	0.11	0.23	1.948	248	.001	0.308
Politeness (E.g., thank, please, thanks)	**0.40**	1.62	0.16	0.39	1.037	248	.049	0.164
Health (E.g., medic, patients, physician, health)	0.87	0.98	**1.26**	1.70	-2.137	248	.023	-0.338
Wellness (E.g., healthy, gym, exercise, diet)	0.04	0.14	**0.21**	0.67	-3.376	248	.047	-0.534
Emotional anxiety (E.g., worry, fear, afraid, nervous)	**0.42**	0.68	0.26	0.53	1.551	248	.044	0.245
Lifestyle (E.g., work, home, school, working)	**1.85**	1.69	1.29	1.24	2.223	248	.027	0.351
Leisure (E.g., TV, cook, chat, fun, play)	**0.17**	0.37	0.09	0.22	1.435	248	.048	0.227
Home (E.g., home, lawn, room, furniture)	**0.46**	0.66	0.25	0.41	2.132	248	.006	0.337
Work (E.g., work, school, working, class)	**0.87**	1.12	0.52	0.63	2.112	248	.004	0.334

Conversation (E.g., yeah, oh, yes, okay)	**0.55**	0.92	0.22	0.43	2.444	248	<.001	0.386
Netspeak (E.g., I know, u, lol, haha)	**0.42**	0.85	0.19	0.39	.010	248	.005	0.032
Assent (E.g., yeah, yes, okay, ok)	**0.12**	0.41	0.03	0.08	1.577	248	.004	0.249

[a] Welch test is reported because Levene's test indicated that the homogeneity of variances assumption was not met for this variable.

This study is the first to investigate the types of help and advice presented in the comments among women with DV experience in an OHC. We found that most women received information and emotional support, and the most common types of help received are DV knowledge and shelter/agency. We also found that most women received experience sharing in the comments, and 80% of them received the help they sought in OHCs. Legal help and DV knowledge are the top two help well-received by women with DV experience in OHCs.

We found that most OHC members shared their experiences as evidence to provide help and showed that OHCs serve as a platform for experience exchange in help-seeking. In the comments, OHC members who shared a similar experience with the OP will share their own stories and experience before they give advice. For example, OHC members used to share how to deal with DV agencies, police maltreatment, lengthy legal procedure, and couple counseling as an experience reference. When women sought help from the OHC, they listened to others' stories (e.g., OP returned to their initial postings and responded) and experiences. They returned to the initial postings to show gratitude and ask further questions to whom they could resonate, based on their understanding of others' experiences. If OHC members shared something highly related to OPs' condition, OPs tend to react more positively and plan the next step proactively. This result illustrates that women with DV experience relied on others' experiences to decide what to do next. We found that interest and experience-sharing behaviors can generate a "buddy feeling" or a feeling of familiarity as the OP does not feel alone in their help-seeking. Our findings echoed a previous study in a mental health context. OHC members' perceptions and experiences about the treatment are closely related to the perceived effectiveness of treatment among OHC members (Yan & Tan, 2017). Similarly, Fan et al. (2010) reported experience-sharing behavior as one approach to building trust with other members in OHCs. In the DV context, Krisvianti and Triastuti (2020) concluded that the exchange of experience and knowledge in OHC facilitates the

empowerment and social support among Indonesian women, while Afdal et al (2019) found the use of OHC can improve life satisfaction.

Moreover, emotional empowerment is another important theme identified in the comments. OHCs members provided words of encouragement, empathy, and reassurance when OP was lost and helpless. Previous studies pinpointed the strong association between emotional support and DV severity (Hui & Constantino, 2021). Therefore, OHCs members possibly could provide emotional help with a timely response without geographical restrictions. We also found that women with DV experience sought help by asking someone to prove whether they were acting normal and not overreacting to their intimate partners' behavior. An affirmation statement like "you are doing the right thing" further justified a decision made by OP, which also consolidated their confidence to continue seeking help in OHCs. Our findings were consistent with previous OHCs studies in various contexts ranging from pregnancy loss (Andalibi & Garcia, 2021), breast cancer (Yoo et al., 2014), and ovarian cancer (Benson et al., 2020). Similarly, Sagers (2020) and Sivagurunathan et al. (2021) reported the need for emotional validation in help-seeking after sexual assault and male DV experience, respectively. With the consistent findings from previous literature, our study showed that emotional empowerment and validation are prevalent and important among women with DV experience in OHC.

Furthermore, it is noteworthy that displaying DV knowledge in the comments is a common way to present advice in OHCs among the DV population. Our findings showed that OHC members used to cite DV statistics from trustworthy organizations and highlight the DV knowledge in trauma bonding, reactive abuse, stages of abuse, and warning signs of DV (i.e., strangulation and choking) to build the credibility of advice. This situation is widespread when women are confused and need clarification of their DV experience. OHC members contribute their DV knowledge to help women recognize danger signs and navigate them to have possible help in

reality. We also performed a categorization of the information links and annotated the books' names provided in the comments.

Interestingly, our results show that 13% of our sample shared the book "Why does he do that" by Lundy Bancroft and well-received positive comments from OHC members. Our results implicate that OHCs could provide women the resources to clarify their DV situation by displaying relevant DV knowledge and resources. Although this study is the first to explore the websites and books shared in OHCs for the DV population, Khushboo et al. (2022) have explored the strong association between types of shared resources and resources' relevance to ovarian cancer OHCs. Future studies need to validate the quality of comments and resources by domain experts in the DV field, explore whether shared resources involve trauma-informed information, and compare the website sharing behavior between postings with a different number of comments.

Another interesting finding from our analysis was that the advice style could be divided into the directive and emphasizing empowerment and advice. The directive style is straightforward and commonly seen in urgent postings with multiple triggers and alerts from Reddit. OHC members can react emotionally as most of them were not trained in trauma-informed care. With the disinhibition effect on OHCs, OHC members do not take responsibility for what they suggested and said to OP. For example, they feel safer saying things online under anonymity and invisibility.

On the other hand, we also identified comments with more empowerment and advice based on OHCs. Some of the comments validated emotions of OP and addressed empathy first, followed by giving some relatable experiences and advice, and ended with encouragement. As a previous study demonstrated the importance of emotional support for women with DV experience, this advice style is deemed more appropriate and helpful (Hui & Constantino, 2021). Whiting et al. (2019) reported that 37% of the comments contained victim-blaming messages in OHCs. Though our findings did not capture many victim-blaming messages in the thematic analysis, our study's methodological and screening process could be the reasons. As we filtered postings for those OPs

who never returned, we realized that perhaps the negative response to help was not well captured in our analysis.

We also adopted LIWC analysis to understand the help-seeking result from a computational view at the word level. Doing so, we found that postings with more polite words have a higher chance of receiving the help they sought. Since OHCs are virtual environments, users cannot see their facial expressions. However, they may provide help based on the interpretation of the text. As such, politeness in the initial postings could indicate that OHC members offer help more comfortably. Simultaneously, our results found that initial postings with more wordings that mentioned health and wellness have a lower chance of receiving the help they sought. One possible explanation is that OHC members might not have the expertise to provide help for postings with complicated and challenging medical conditions. A scoping review done by Perry et al. (2021) showed that only one article featured a moderator who possessed health professional qualifications, the moderator from the rest of the OHCs articles were volunteers only. Hence, postings with health concerns may not be easily answered by OHC members or even moderators as they do not have professional training to provide support.

However, posting titles using more words with negative sentiment were more likely to receive help than using wordings with positive sentiment. As OHCs provide prompt responses from members everywhere, women with DV experience could feel more comfortable seeking help emotionally or urgently in OHCs (Chandan et al., 2020). A recent study shows that 49.5% of women suffered from psychological illness after the DV traumatic experience. Liu et al. (2020) reported that psychological disease patients' posts included more negative emotions than others. In the help-seeking virtual environment, the title sentiment could be the main indicator of the situation's urgency in different postings. As such, the postings with more negative sentiments could draw the attention of moderators and OHCs members to provide help more quickly than others.

This study showed that OHC provided DV knowledge and related experience sharing to women with DV experience. Clinicians need to evaluate the perceived DV knowledge before providing treatment to women, such as the understanding of DV consequences, dangerous signs of DV, and potential safety plans for protecting their lives. Since women may need similar experiences to validate their decisions and feelings after the DV experience, clinicians could advise women to look for someone who can resonate with their experience on OHCs. Future DV digital interventions would consider including similar experience sharing as a feature to encourage help-seeking among women. For example, crawling DV experience automatically from the public dataset and reviewed by a domain expert could be a possible way to provide related DV experience in digital interventions to improve help-seeking initiatives. However, clinicians would also warn women that potential re-traumatizing feelings may occur when they reread others' experiences on OHCs. Also, a directive style of advice is commonly seen in OHCs. Clinicians should guide women, but women should not take all the advice personally if the comments are disrespectful and aggressive. A standard protocol needs to be developed by domain experts to inform nurses, social workers, and healthcare providers when should direct women with DV experiences to OHCs for better help-seeking. When clinicians advise women on how to seek help in OHCs, addressing the importance of using a title with more negative sentiments and showing politeness in the initial posting could help them get the help they need in OHCs.

It is worth acknowledging that the results should be interpreted under certain contexts. For instance, using Reddit as the data source, we could not extract user demographic information, such as race, age, and educational background. As Reddit is only widely used in several English-speaking countries, the results from this study should not be completely generalizable to another context. While the focus of this study was primarily exploring the OHCs' comments for help-seeking, choosing multiple OHCs for evaluation is encouraged to advance these findings. In the post-screening process, this study relied on the initial post content to judge the eligibility based on

sex and age. There could be possibilities that some OP did not disclose their real sex and age for privacy issues. Simultaneously, our study prioritized the postings according to the number of comments and times OP returned to postings. Comparing postings with and without comments could be insightful in exploring the help-seeking parameters on OHCs. Growing evidence suggests OHCs could be a useful platform for women with DV experience; however, exploring the negative comments and suggestions by domain experts is necessary to prevent re-traumatization in this vulnerable population.

4.4 Conclusion

This study elicits empirical evidence on the types of help received among women with DV experience and what contributes to the advice credibility in OHCs. Our results demonstrate that providing relatable experience with DV knowledge is a common way to present advice in OHCs. Hence, OHCs served as an experience exchange and knowledge acquisition platform for women who feel lost and confused after the DV experience. Our findings contribute implications for providing DV knowledge and relatable experience to women in their help-seeking through a textual digital intervention that could be useful. In addition, we examined the linguistic differences between successful and unsuccessful help-seeking based on initial postings in OHCs. Our results shed light on the linguistic difference in title sentiment and politeness that may impact help-seeking on OHCs. Future studies should analyze the linguistic differences between postings with the highest and lowest number of comments to further validate the findings from our study. Overall, OHC provided a supportive environment in terms of experience exchange, emotional validation, and DV knowledge to help women recognize the risks and severity of their DV experience.

5.0 Overall discussion

The findings from this study elicited the demand for DV knowledge among women with DV experiences. Seeking DV knowledge for clarification and validation were commonly found in OHCs. Through examining the initial postings, the OPs were eager to understand and recognize the severe consequences of DV. Before seeking help in formal channels, women with DV experiences would like to familiarize themselves with better knowledge when they need to deal with the officials or solicitors in DV issue. Therefore, it is highly possible that OHCs could be a reliable platform for DV knowledge education. Future studies should leverage the OHCs platform to identify the knowledge level, health literacy and inform the design of DV education materials for this population.

Apart from the demand for DV education, this study also proved OHCs could be a rich data source for understanding help-seeking. The information extracted were immerse, including specific DV agencies name, DV hotline, social media, websites, books and general information need such as legal, childbearing, safety planning etc. These information data should be validated by domain experts to assess the quality of advice, trustworthiness, and safety. If any information that could be misleading and traumatic to women with DV experiences, the subsequent steps should create the alert regarding misinformation or misleading advice circulated in OHCs.

Although several notable implications were derived from the study, the limitations should also be considered. First, the data source from Reddit limits the generalizability as most OHC users come from English-speaking countries only. Using social media as a data source suffers from demographic details such as gender, age, and educational background. Our inclusion criteria depend on the disclosure from OP initial postings only, and we assumed that everyone is heterosexual if no homosexual information was extracted. Therefore, it is possible that some OP

were homosexual, and they did not disclose their sexual orientation in their initial post. Also, only one subreddit community was examined in this study. Therefore our results should not be generalizable to other OHCs from another cultural context.

Regarding the screening of postings, this study prioritized the postings with more than three comments, and OP returned at least once. We excluded postings without comments and OP returns. Therefore, the percentage of the matching need from our study might not reflect the overall help-seeking result in this population. Also, we limited the scope of help-seeking in this study. Some miscellaneous postings related to the aftermath of DV were excluded. For example, victims turning out to be the abuser, fear of gynecological visits, and minor daily issues like transportation and moving.

In terms of the measurement of matched needs and unmatched needs, this study made some adjustments that needs caution to interpret the data. For example, the last category of information support (i.e., others) was divided into three aspects in aim 1 (i.e., general advice, pet, and miscellaneous) because most of the questions asked were specific and clear to capture in annotation. If the OP asked for general advice in the initial postings and received at least three types of help in the comments, this situation was classified as broadly coverage in matching needs. Therefore, aim 2 results just reported the total number of general advice received only. This study showed that extracting the help-seeking questions from initial postings is feasible, while extracting the matching needs from comments might have different granularity to design the measurement. Data availability and text presentation from OHCs are the important factors to consider the measurement.

The framework used in this study was developed in 2005 based on help-seeking behavior among women with DV experiences. However, this framework is not for OHCs and thus, it may not be able to capture concepts presented in OHCs such as linguistic differences, posting features

etc. This study served as the foundation to understand help-seeking behavior in OHCs and paved the way for future framework development specifically serve this population.

Our study is the first one to explore the help-seeking result in OHCs. The result of our study contributes to the current knowledge regarding the general percentage of women who successfully received help from OHCs. As our dataset prioritized the number of comments in postings, the generalizability of our result is only limited to DV OHCs with more than four comments. Therefore, future studies should compare the help-seeking result in postings with fewer comments received.

This dissertation has the potential to guide future research. The annotation, qualitative thematic analysis, and linguistic analysis findings suggest a significant need for extracting help-seeking information from OHCs for further validation by DV domain experts. Our results elicited abundant specific named information, such as DV agencies, websites, phone numbers, social media, and book names available in OHCs. However, this information has not been validated by professionals in the DV field to decide whether these resources are reliable and safe for women with DV experiences. As such, assessing these resources' quality and trustworthiness is crucial to determining whether OHCs should be referred to women with DV experiences.

Secondly, the approach of this study lays the foundation for extracting OHCs data to explore help-seeking. In this study, we leveraged manual annotation, qualitative thematic analysis, and computational linguistic tools to understand the help-seeking behavior in the DV population. This is the first study to combine all these techniques. The annotation framework of this study can guide future research in extracting help-seeking concepts automatically with advanced natural language processing techniques in machine learning.

The linguistic and posting features from our results indicate that the different use of wordings from initial postings could predict the help-seeking result in OHCs. Though the sample size of this study is limited to 250 postings, our preliminary results show that politeness, title

sentiment, and the number of comments could be important indicators to predict the likelihood of receiving the help women sought. Automatic suggestions or guidance could be provided for DV victims and survivors to seek help successfully in OHCs if more linguistic, and postings features can be identified with a larger sample size.

6.0 Conclusion of dissertation findings

This dissertation study emphasizes the help-seeking behavior in OHCs among women with DV experiences, including the types of help sought, received, and help-seeking results. Based on the manual annotations, linguistic and posting features were identified to understand what truly dictates the help-seeking result in OHCs. By harvesting the strengths of text mining, OHCs data has a lot of potentials to predict the help-seeking result, which can potentially lead to the development of a personalized help-seeking model for DV victims and survivors. Moving forward, this study served as the foundation to guide the annotation framework for OHCs data on help-seeking and eventually paved the way for developing automatic OHC-based interventions to allow DV victims/survivors to access individually tailored support in help-seeking.

Appendix A: Annotation Codebook

Appendix A. Codebook for Reddit post annotation.

Concepts	Definition
Domestic Violence characteristics	
Types of abuse	(1) Physical abuse: any slapping, shaking, punching, beating, biting, pushing, pulling hair, pinching, kicking, stabbing, tickling excessively, threatening, abandonment in dangerous situations, property/pet destruction, wielding weapons, use of weapons, denials of medical care, and driving recklessly. (2) Sexual abuse: any unwanted sexual acts, forces sexual acts without consent. (3) Emotional abuse: any emotional, verbal, or mental abuse including an accusation of infidelity, humiliation, name-calling, isolation, locking out of the home, manipulation, and continuous criticism. (4) Financial abuse: any restriction from work, or money control.
Sex of Victim	(1) Female (2) Male (3) Not available
Age	Please enter the exact age of OP (& the abuser) as disclosed in the initial post.
Help-seeking behaviors – Sources of Help asked and received	
Specific named information	Specific named information that is explicitly asked/provided in OHCs. (1) Yes (2) No
Agency Name	Name of the agency
Phone	Phone number of any DV agency/organization/government department/network
Website	Any websites of any DV agency/organization/government department/network
Social media	Any social media of any DV agency/organization/government department/network
Book	Any books suggested or asked?
Other	Other specific named information of any DV agency/organization/government department/network
General information	General information that is implicitly asked/provided in OHCs. (1) Yes (2) No
Information support	Did the Original Poster (OP) ask for/ Comments reply with information support?

	(1) Yes (2) No
	Provide any of the following information: (1) Shelters/ DV center/ Agency (2) Legal (3) Childbearing (4) Police (5) Wound assessment/record (6) DV report procedure/Documentation (7) Safety planning (8) Finance (9) Housing (10) Healthcare information (counseling, psychiatrist, doctor, etc.) (11) DV survivors' network/ (Online) support groups (12) DV knowledge (13) Communication (14) Miscellaneous (Other)
Emotional support	Did the Original Poster (OP) ask for/ Comments reply with emotional support?
	(1) Yes (2) No
	Provide any of the following support: (1) Love (2) Empathy (3) Mutual understanding (4) Reassurance (5) Acceptance (6) Encouragement. (E.g., You are not alone; I am sorry for; I have similar experience; you have been through a lot; you are brave)
Experience sharing	The comments provided emotional support by sharing relatable experiences of living with DV. (1) Yes (2) No
Networking offer sharing	The comments welcomed OP to contact them/ provided their contact information in OHCs. (1) Yes (2) No
Posting features	**Post score:** the total number of upvotes minus the number of downvotes in the post. **Post comments:** the total number of comments in the post. **The number of times OP back:** how many times OP returned and commented on the post. **The number of words on comments:** how many words are on the comments in total. **Title sentiment score:** the sentiment score is based on the title.

	Links shared: how many links are shared in each post. **Emoji use:** how many emojis are used in each post. **Parts of speech tags:** how many nouns, verbs, and adjectives are in each post.

Appendix B: LIWC variables description

Category	Abbrev.	Description/Most frequently used exemplars
Summary Variables		
Word count	WC	Total word count
Analytical thinking	Analytic	Metric of logical, formal thinking
Clout	Clout	Language of leadership, status
Authentic	Authentic	Perceived honesty, genuineness
Emotional tone	Tone	Degree or positive (negative) tone
Words per sentence	WPS	Average words per sentence
Big words	BigWords	Percent words 7 letters or longer
Dictionary words	Dic	Percent words captured by LIWC
Linguistic Dimensions	Linguistic	
Total function words	function	the, to, and, I
Total pronouns	pronoun	I, you, that, it
Personal pronouns	ppron	I, you, my, me
1st person singular	i	I, me, my, myself
1st person plural	we	we, our, us, lets
2nd person	you	you, your, u, yourself
3rd person singular	shehe	he, she, her, his
3rd person plural	they	they, their, them, themsel*
Impersonal pronouns	ipron	that, it, this, what
Determiners	det	the, at, that, my
Articles	article	a, an, the, alot
Numbers	number	one, two, first, once
Prepositions	prep	to, of, in, for
Auxiliary verbs	auxverb	is, was, be, have
Adverbs	adverb	so, just, about, there
Conjunctions	conj	and, but, so, as
Negations	negate	not, no, never, nothing
Common verbs	verb	is, was, be, have
Common adjectives	adj	more, very, other, new
Quantities	quantity	all, one, more, some
Psychological Processes		
Drives	Drives	we, our, work, us
Affiliation	affiliation	we, our, us, help
Achievement	achieve	work, better, best, working
Power	power	own, order, allow, power
Cognition	Cognition	is, was, but, are
All-or-none	allnone	all, no, never, always
Cognitive processes	cogproc	but, not, if, or, know
Insight	insight	know, how, think, feel
Causation	cause	how, because, make, why
Discrepancy	discrep	would, can, want, could
Tentative	tentat	if, or, any, something
Certitude	certitude	really, actually, of course, real
Differentiation	differ	but, not, if, or
Memory	memory	remember, forget, remind, forgot
Affect	Affect	good, well, new, love
Positive tone	tone_pos	good, well, new, love
Negative tone	tone_neg	bad, wrong, too much, hate
Emotion	emotion	good, love, happy, hope
Positive emotion	emo_pos	good, love, happy, hope
Negative emotion	emo_neg	bad, hate, hurt, tired
Anxiety	emo_anx	worry, fear, afraid, nervous
Anger	emo_anger	hate, mad, angry, frustr*
Sadness	emo_sad	:(, sad, disappoint*, cry
Swear words	swear	shit, fuckin*, fuck, damn
Social processes	Social	you, we, he, she
Social behavior	socbehav	said, love, say, care
Prosocial behavior	prosocial	care, help, thank, please
Politeness	polite	thank, please, thanks, good morning
Interpersonal conflict	conflict	fight, kill, killed, attack
Moralization	moral	wrong, honor*, deserv*, judge
Communication	comm	said, say, tell, thank*
Social referents	socrefs	you, we, he, she
Family	family	parent*, mother*, father*, baby
Friends	friend	friend*, boyfriend*, girlfriend*, dude
Female references	female	she, her, girl, woman
Male references	male	he, his, him, man

Category	Abbrev.	Description/Most frequently used exemplars
Expanded Dictionary		
Culture	Culture	car, united states, govern*, phone
Politics	politic	united states, govern*, congress*, senat*
Ethnicity	ethnicity	american, french, chinese, indian
Technology	tech	car, phone, comput*, email*
Lifestyle	lifestyle	work, home, school, working
Leisure	leisure	game*, fun, play, party*
Home	home	home, house, room, bed
Work	work	work, school, working, class
Money	money	business*, pay*, price*, market*
Religion	relig	god, hell, christmas*, church
Physical	physical	medic*, food*, patients, eye*
Health	health	medic*, patients, physician*, health
Illness	illness	hospital*, cancer*, sick, pain
Wellness	wellness	healthy, gym*, supported, diet
Mental health	mental	mental health, depressed, suicid*, trauma*
Substances	substances	beer*, wine, drunk, cigar*
Sexual	sexual	sex, gay, pregnan*, dick
Food	food	food*, drink*, eat, dinner*
Death	death	death*, dead, die, kill
States		
Need	need	have to, need, had to, must
Want	want	want, hope, wanted, wish
Acquire	acquire	get, got, take, getting
Lack	lack	don't have, didn't have, *less, hungry
Fulfilled	fulfill	enough, full, complete, extra
Fatigue	fatigue	tired, bored, don't care, boring
Motives		
Reward	reward	opportun*, win, gain*, benefit*
Risk	risk	secur*, protect*, pain, risk*
Curiosity	curiosity	scien*, look* for, research*, wonder
Allure	allure	have, like, out, know
Perception	Perception	in, out, up, there
Attention	attention	look, look* for, watch, check
Motion	motion	go, come, went, came
Space	space	in, out, up, there
Visual	visual	see, look, eye*, saw
Auditory	auditory	sound*, heard, hear, music
Feeling	feeling	feel, hard, cool, felt
Time orientation		
Time	time	when, now, then, day
Past focus	focuspast	was, had, were, been
Present focus	focuspresent	is, are, I'm, can
Future focus	focusfuture	will, going to, have to, may
Conversational	Conversation	yeah, oh, yes, okay
Netspeak	netspeak	:), u, lol, haha*
Assent	assent	yeah, yes, okay, ok
Nonfluencies	nonflu	oh, um, uh, i i
Fillers	filler	rr*, wow, sooo*, youknow

Appendix C: IRB Approval

University of Pittsburgh | Institutional Review Board
Office of Research Protections

EXEMPT DETERMINATION

Date:	June 6, 2022
IRB:	MOD20030179-002
PI:	Chi Ching Vivian HUI
Title:	Exploring help-seeking behavior in online health communities among women with domestic violence experiences
Funding:	None

The Institutional Review Board reviewed and determined the above referenced study meets the regulatory requirements for exempt research under 45 CFR 46.104.

Determination Documentation

Determination Date:	6/6/2022
Exempt Category:	(4) Secondary research on data or specimens (no consent required)

Determinations:	None
Approved Documents:	• IRB_exemption, Category: IRB Protocol

If you have any questions, please contact the University of Pittsburgh IRB Coordinator, Dana DiVirgilio.

Please take a moment to complete our Satisfaction Survey as we appreciate your feedback.

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