

SAFECONNECT

Bridging Help-Seekers and Volunteers with
Database Management



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The idea for the SafeConnect data-based app is inspired by volunteering for urgent domestic violence incidents experienced by women and LGBTQ+ individuals.

The gap between help-seekers and volunteers can leave many without support, affecting their well-being or safety. For volunteers, it's an opportunity to effectively use their skills to serve the community.

THE PROBLEM AND INTRODUCTION

This database-driven platform will manage information about help seekers, and volunteers, and handle the incidents and interventions, to ensure efficient and suitable matches based on the needs.

WHY AN ANTI-VIOLENCE APP?

1

**Many communities
suffer from
various forms of
violence**

Gender-based violence (GBV) is violence that is committed against someone based on their gender identity, gender expression, or perceived gender.

It can be physical, emotional, psychological, or sexual in nature. GBV disproportionately impacts women and girls, Indigenous peoples, and other diverse populations.

GOVERNMENT OF BRITISH COLUMBIA. (N.D.). GENDER-BASED VIOLENCE, SEXUAL ASSAULT, AND DOMESTIC VIOLENCE

[HTTPS://WWW2.GOV.BC.CA/GOV/CONTENT/SAFETY/PUBLIC-SAFETY/DOMESTIC-VIOLENCE](https://www2.gov.bc.ca/gov/content/safety/public-safety/domestic-violence)

WHY AN ANTI-VIOLENCE APP?

2

The needs from a violence incident might not be satisfied by a single organization

Emergency shelter was identified as a top immediate victim need (0-3 months post-victimization) by over a third (36 percent) of victim service providers.

More than one third of victim service providers identified life skills as a top long-term victim need or a need that emerged six months or later after their victimization experience (38 percent).

ILLINOIS CRIMINAL JUSTICE INFORMATION AUTHORITY. (2023). VICTIM NEED REPORT: SERVICE PROVIDERS' PERSPECTIVES ON THE NEEDS OF CRIME VICTIMS AND SERVICE GAPS. ILLINOIS CRIMINAL JUSTICE INFORMATION AUTHORITY.

[HTTPS://ICJIA.ILLINOIS.GOV/RESEARCHHUB/ARTICLES/VICTIM-NEED-REPORT-SERVICE-PROVIDERS-PERSPECTIVES-ON-THE-NEEDS-OF-CRIME-VICTIMS-AND-SERVICE-GAPS/](https://icjia.illinois.gov/researchhub/articles/victim-need-report-service-providers-perspectives-on-the-needs-of-crime-victims-and-service-gaps/)

WHY AN ANTI-VIOLENCE APP?

3

Individuals that are more marginalized face more barriers when accessing resources

Six primary themes emerged in regard to the unique issues related to people with disabilities seeking help for domestic violence:

lack of accessible services, different manifestations of abuse, isolation, negative attitudes toward people with disabilities, varied experiences among people with disabilities, and the Deaf community is a small world.

LIGHTFOOT, E., & WILLIAMS, O. (2009). THE INTERSECTION OF DISABILITY, DIVERSITY, AND DOMESTIC VIOLENCE: RESULTS OF NATIONAL FOCUS GROUPS. JOURNAL OF AGGRESSION, MALTREATMENT & TRAUMA, 18(2), 133-152. [HTTPS://DOI.ORG/10.1080/10926770802675551](https://doi.org/10.1080/10926770802675551)

THE PROBLEM OF POTENTIAL PLATFORMS

The platform (WeChat, Facebook, WhatsApp) is not suitable for this purpose due to:

- Lack of specialized groups and linear message logic
- Information getting lost among social media and personal messages
- Lack of screening for identity or intention
- Difficulty in finding volunteers, especially those with specialties
- Absence of an organized archive for past interventions.

THE APP WE WANT TO CREATE

- Create a platform with a focused purpose and immediate connection.
- Connect needs with resources and expertise.
- Establish community and support networks.
- Track identity and involvement.
- Automatically filter out invalid interventions and learn from experience.
- Analyze past incidents to take appropriate actions, make petitions, and develop community resources.
- We set the scope for this app to be in Vancouver currently.

DATABASE DESIGN

ER DIAGRAM

ENTITIES

USERCASE
WALKTHROUGH

ER DIAGRAM

BASIC ENTITIES

(in blue)

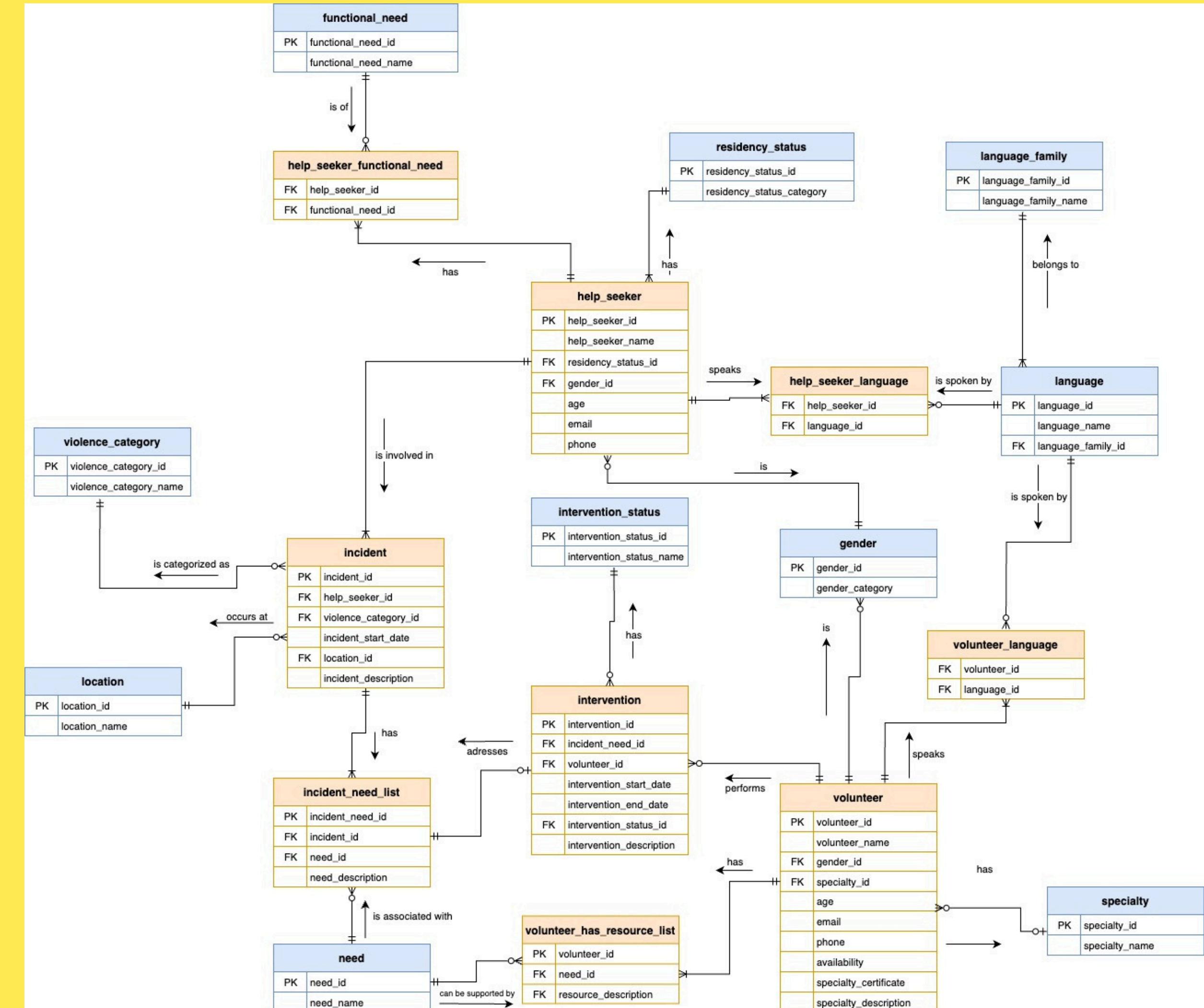
- 10 tables
- basic categories

USER CASE ENTITIES

(in orange)

- 9 join tables
- associated with ≥ 2 basic entities
(one/many-to-many)
- app functionality

DATABASE DESIGN



A USER CASE WALKTHROUGH

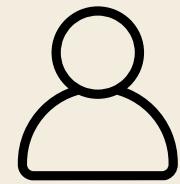


HELP SEEKER

Registers basic information & language

→ Reports an incident →

Selects relevant functional needs and general needs



VOLUNTEER

Registers basic information (incl. specialty) & language

→ Selects resources that could be provided matching the needs



APP

Checks the resources and availability of the volunteers

→ Activates an intervention according to an incident-need pair →

Keeps track of the intervention and records the effectiveness with an end date

DATA SOURCES AND METHODS

DATA SOURCE

ASSUMPTIONS

DATA SOURCES

BASIC ENTITIES

10 tables

Basic category data based on facts, related publications, and public statistics:

- violence category,
- location,
- need category,
- etc.

USER CASE ENTITIES

9 tables

Mock user case data generated using generative AI(ChatGPT) with our specific prompts for each entity, simulating realistic scenarios for analysis and visualization:

- help seekers info,
- incident and needs,
- volunteers and resources,
- interventions,
- etc.

DATA SOURCES

USER CASE ENTITIES - Mock data generation steps

9 tables

- 1 Setup database and tables, insert value of the 10 basic entities. Provide the setup file for AI to analyze the basic information and relationship with predefined table cardinality, participation constraints, PKs and FKs.
- 2 Define the assumptions as prompts provided for AI in terms of sample size, value output example, and constraints. Quantify the approximate distribution and percentage of the value based on our research on the related source and statistics.
- 3 Make manual adjustments to clean the generated mock data, to address the limitation of AI in processing complex database models and relationships.
- 4 Insert the value of the final version into the database.
- 5 Use a stored procedure to further filter out the invalid data based on the function logic of the application.

ASSUMPTIONS

Help Seeker

Stores information about individuals seeking help

Gender ratio: 4 (women) : 2 (men) : 2 (other genders)

Residency status: Higher proportion of non-immigrants and immigrants compared to temporary residents

Age: Predominantly 12-44 years, with some older women included

Sample Size: 100 records

Incident

Records each incident of violence

Correlation between help seekers and types of violence (e.g., immigrants > non-immigrants for domestic violence)

Location distribution based on population proportions (e.g., Vancouver, Surrey, Richmond)

Incident date starting from 2023-01-01

Sample Size: 100 records

Incident Need List

Lists the needs associated with each incident

Needs distribution based on violence type (e.g., basic needs, counseling, psychological services)

Number of needs per incident (1-3 for domestic violence, 1-2 for bullying and workplace violence)

Sample Size: 200 records

DATA SOURCES AND METHODS

ASSUMPTIONS

Help Seeker

Randomly generated based on foreign keys

Functional Need

Captures the functional needs of help seekers

Sample Size: 50 records

Volunteer

Stores information about volunteers

Randomly generated based on foreign keys

All volunteers are available for all the resources they have

Sample Size: 51 records

Volunteer

Randomly generated based on foreign keys

Resource List

Lists the resources each volunteer can provide to address needs

Sample Size: 101 records

ASSUMPTIONS

Help Seeker Language

Records the languages spoken by help seekers

Each help seeker is associated with one or more languages they speak
Randomly generated to represent linguistic diversity

Sample Size: Random based on constraints

Volunteer Language

Records the languages spoken by volunteers

Each language should be covered by at least one volunteer
Randomly generated to represent linguistic diversity

Sample Size: Random based on constraints

Intervention

Records interventions made for each incident

Intervention start date within 1 month of incident date
Duration based on need type (e.g., housing needs last at least 6 months)
Status distribution (effective, closed, etc.)

Sample Size: 180 records (90% of incidents processed)
After stored procedure screening: $180 - 7 = 172$ records

DATA SOURCES AND METHODS

USER CASES (APPLICATION PROTOTYPE) AND ANALYSIS

QUESTIONS

ANALYSIS

INSIGHTS

STORED PROCEDURES

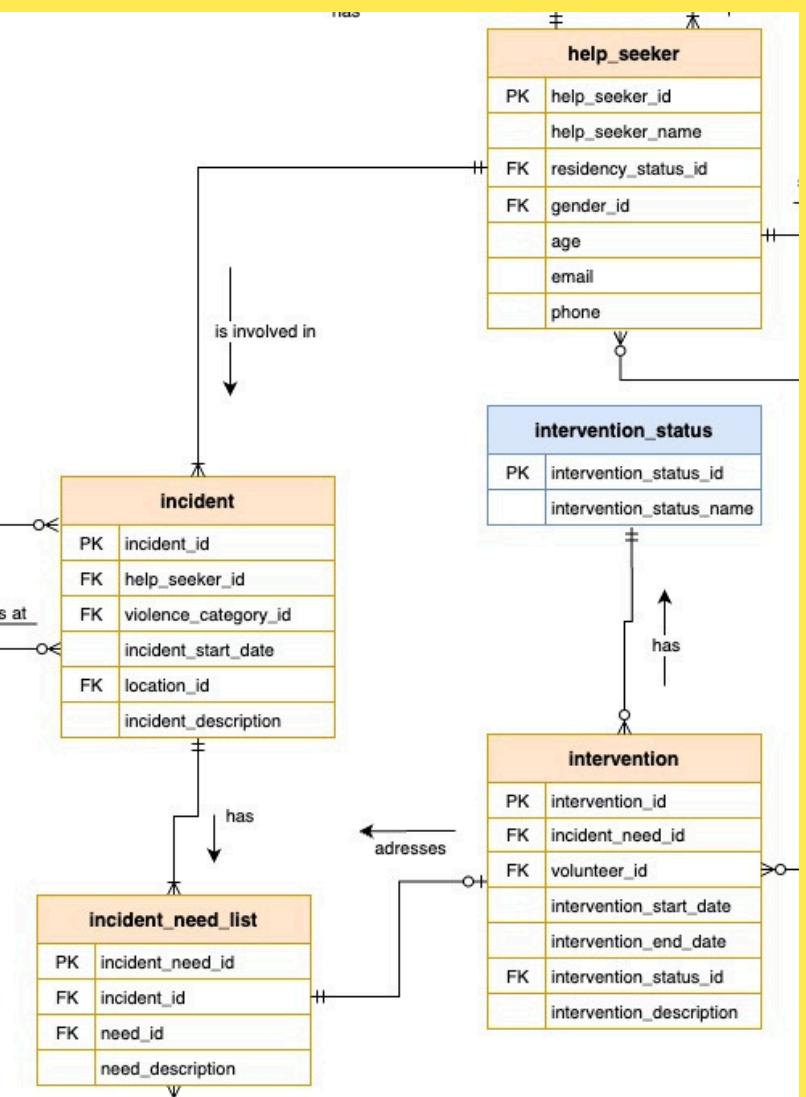
STORED PROCEDURE TO CREATE DELETE INELIGIBLE INTERVENTIONS

- Validation afterwards
- Delete invalid intervention records where volunteers have unmatched resources with incident needs

STORED PROCEDURE TO CREATE INTERVENTION AND MATCH VOLUNTEERS WITH HELP SEEKERS

- Prior control
- Apply the CURSOR operations to FETCH each row in incident_need table and use a WHILE loop to
 - 1) find one volunteer to match with each incident need pairing in order
 - 2) create the corresponding intervention

STORED PROCEDURES



```

CREATE PROCEDURE create_intervention_with_incident_id(
    IN incident_id_param INT)
BEGIN
    DECLARE incident_need_id_var INT;
    DECLARE need_id_var INT;
    DECLARE volunteer_id_var INT;
    DECLARE row_not_found TINYINT DEFAULT FALSE;

    DECLARE incident_need_cursor CURSOR FOR
        SELECT incident_need_id, need_id
        FROM incident_need_list
        WHERE incident_id = incident_id_param;

    DECLARE CONTINUE HANDLER FOR NOT FOUND
        SET row_not_found = TRUE;

    OPEN incident_need_cursor;

    FETCH incident_need_cursor INTO incident_need_id_var, need_id_var
    WHILE row_not_found = FALSE DO # meaning we found the row
        -- Find 1 volunteer to fulfill the need
        SELECT volunteer_id INTO volunteer_id_var
        FROM volunteer_has_resource_list
        JOIN volunteer USING (volunteer_id)
        WHERE need_id = need_id_var
        AND availability = 1
        LIMIT 1;

        -- Create intervention
        IF volunteer_id_var IS NOT NULL THEN
            INSERT INTO intervention(
                incident_need_id,
                volunteer_id,
                intervention_start_date,
                intervention_status_id)
            VALUES (
                incident_need_id_var,
                volunteer_id_var,
                CURDATE(),
                1); -- 1 is for the intervention status 'Pending'
        END IF;

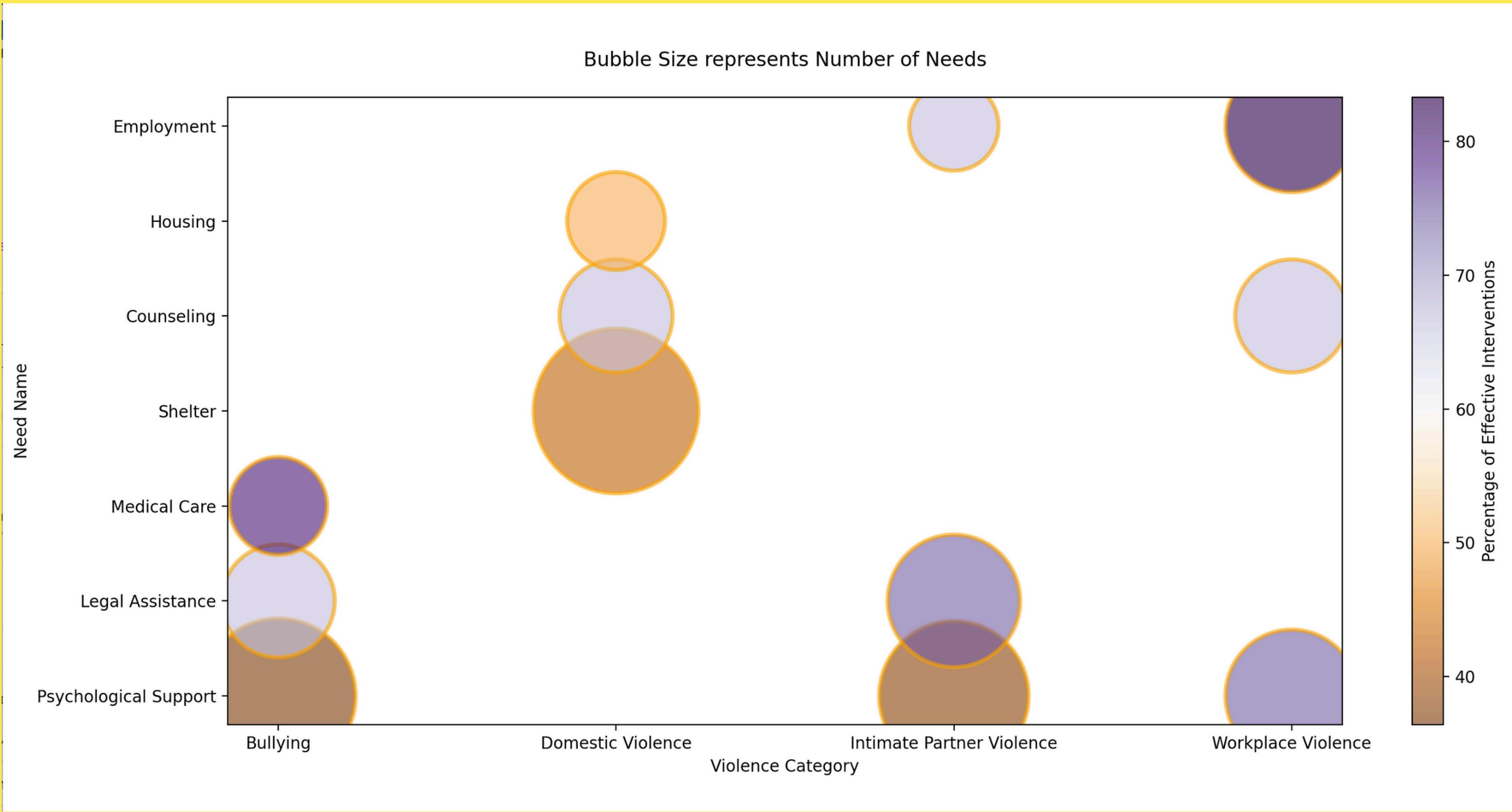
        FETCH incident_need_cursor INTO incident_need_id_var, need_id_var;
    END WHILE;

    CLOSE incident_need_cursor;
END;
  
```

QUESTION 1

For each **violence category**'s various **needs**, 1) how many needs have been requested? 2) What is the percentage of **intervention being effective** out of all interventions (excluding the ones that are closed and escalated) for each pairing of violence category and need ? 3) List the top 3 largest number of needs requested for each violence category.

violence_category	need_name	num_of_need	per_effective
Bullying	Psychological Support	15	36.4
Bullying	Legal Assistance	8	66.7
Bullying	Medical Care	6	80.0
Domestic Violence	Shelter	17	42.9
Domestic Violence	Counseling	8	66.7
Domestic Violence	Housing	6	50.0
Intimate Partner Violence	Psychological Support	14	37.5
Intimate Partner Violence	Legal Assistance	11	75.0
Intimate Partner Violence	Employment	5	66.7
Workplace Violence	Psychological Support	11	75.0
Workplace Violence	Employment	11	83.3
Workplace Violence	Counseling	8	66.7



QUESTION 2

Eskimo-Aleut

Chukotko-Kamchatkan

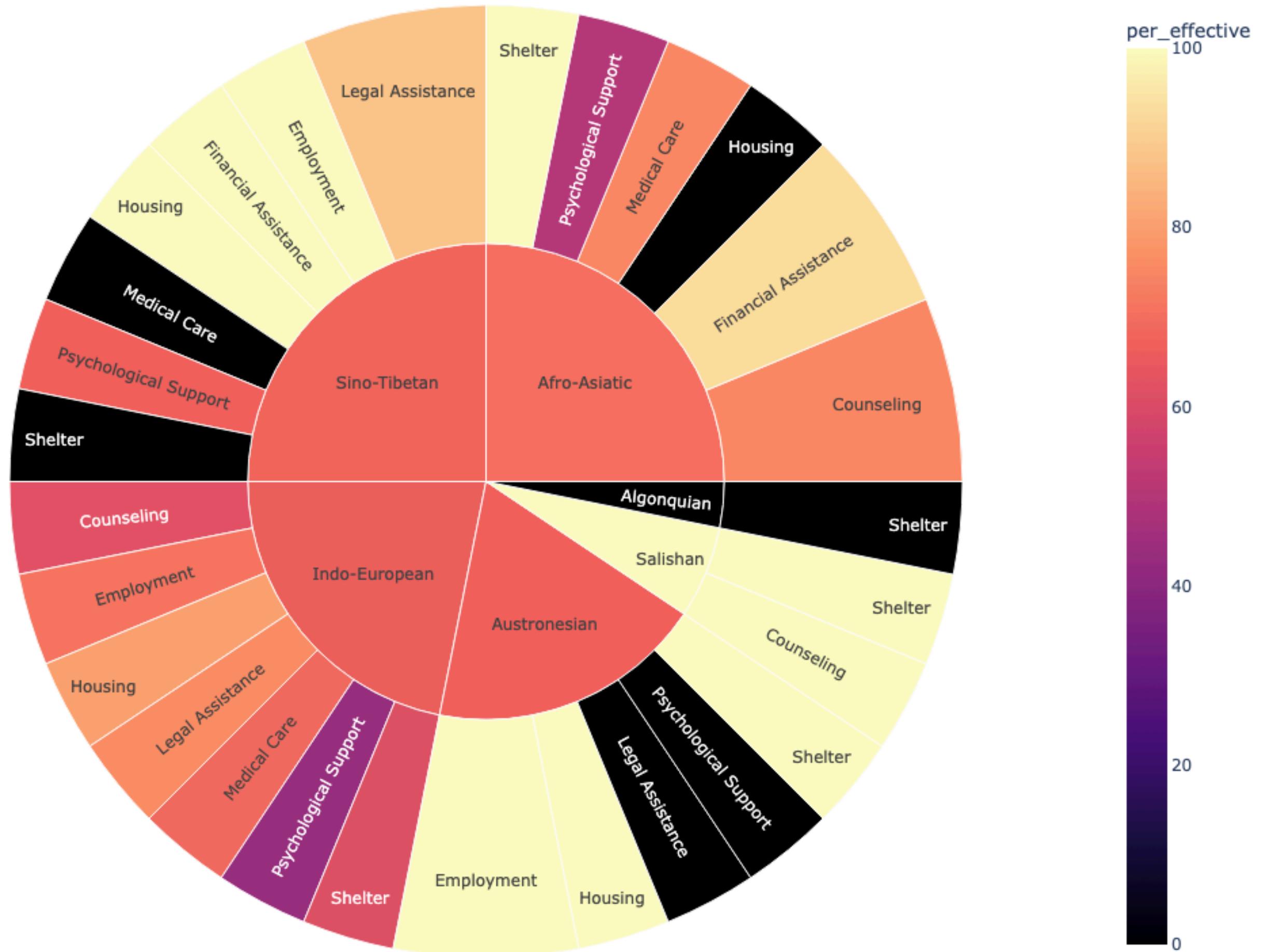
- Indo-European
- Altaic
- Uralic
- Caucasic
- Sino-Tibetan

For each different **language family**, which **needs** are the least **satisfied**? Calculate the satisfaction rate, order from least percentage of effectiveness to most.

language_family	need_name	per_effective
Afro-Asiatic	Housing	0.0
Algonquian	Shelter	0.0
Austronesian	Psychological Support	0.0
Austronesian	Legal Assistance	0.0
Sino-Tibetan	Shelter	0.0
Sino-Tibetan	Medical Care	0.0
Indo-European	Psychological Support	43.2
Afro-Asiatic	Counseling	50.0
Afro-Asiatic	Psychological Support	50.0

- Chukotko-Kamchatkan
- Papuan
- Trans-New Guinea
- Australian
- Afro-Asiatic
- Nilo-Saharan
- Niger-Congo
- Khoisan
- Eskimo-Aleut
- Japanese Language
- Basque Language
- Korean Language
- Amerindian Languages
- Uninhabited Lands

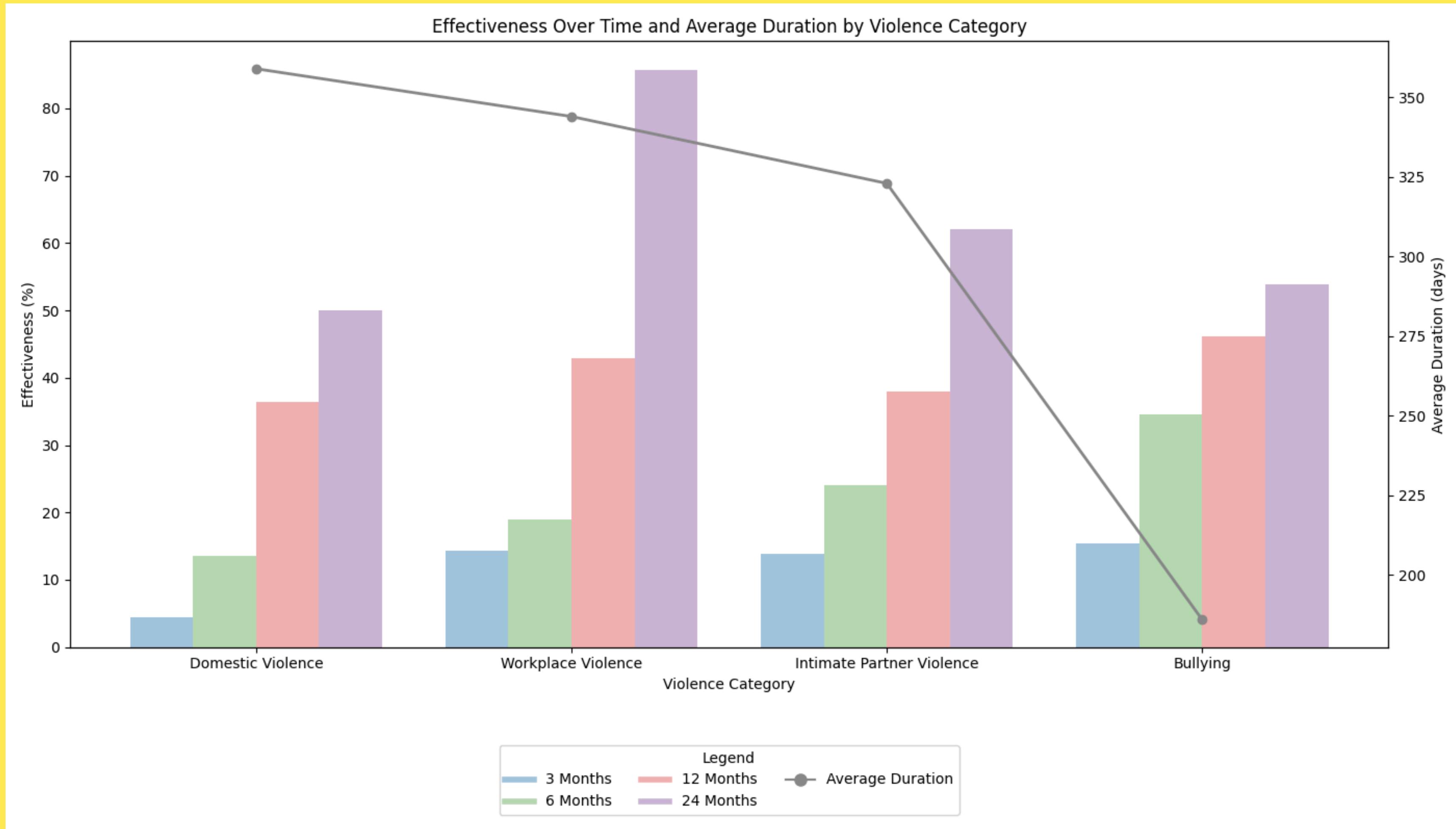
Effectiveness of Interventions by Language Family and Need



QUESTION 3

For each **violence category**, show the percentage of **interventions** being effective out of all interventions (excluding “closed” and = “escalated”) after *3 months*, *6 months*, *12 months* and *24 months*. Output the **average duration** each violence category’s interventions take to be effective (even if it took more than 24 months), ordered by the longest average duration.

violence_category	effective_3_months	effective_6_months	effective_12_months	effective_24_months	average_duration
Domestic Violence	4.3	13.0	34.8	47.8	359
Workplace Violence	10.0	15.0	40.0	80.0	352
Intimate Partner Violence	13.8	24.1	37.9	62.1	323
Bullying	15.4	34.6	53.8	61.5	193

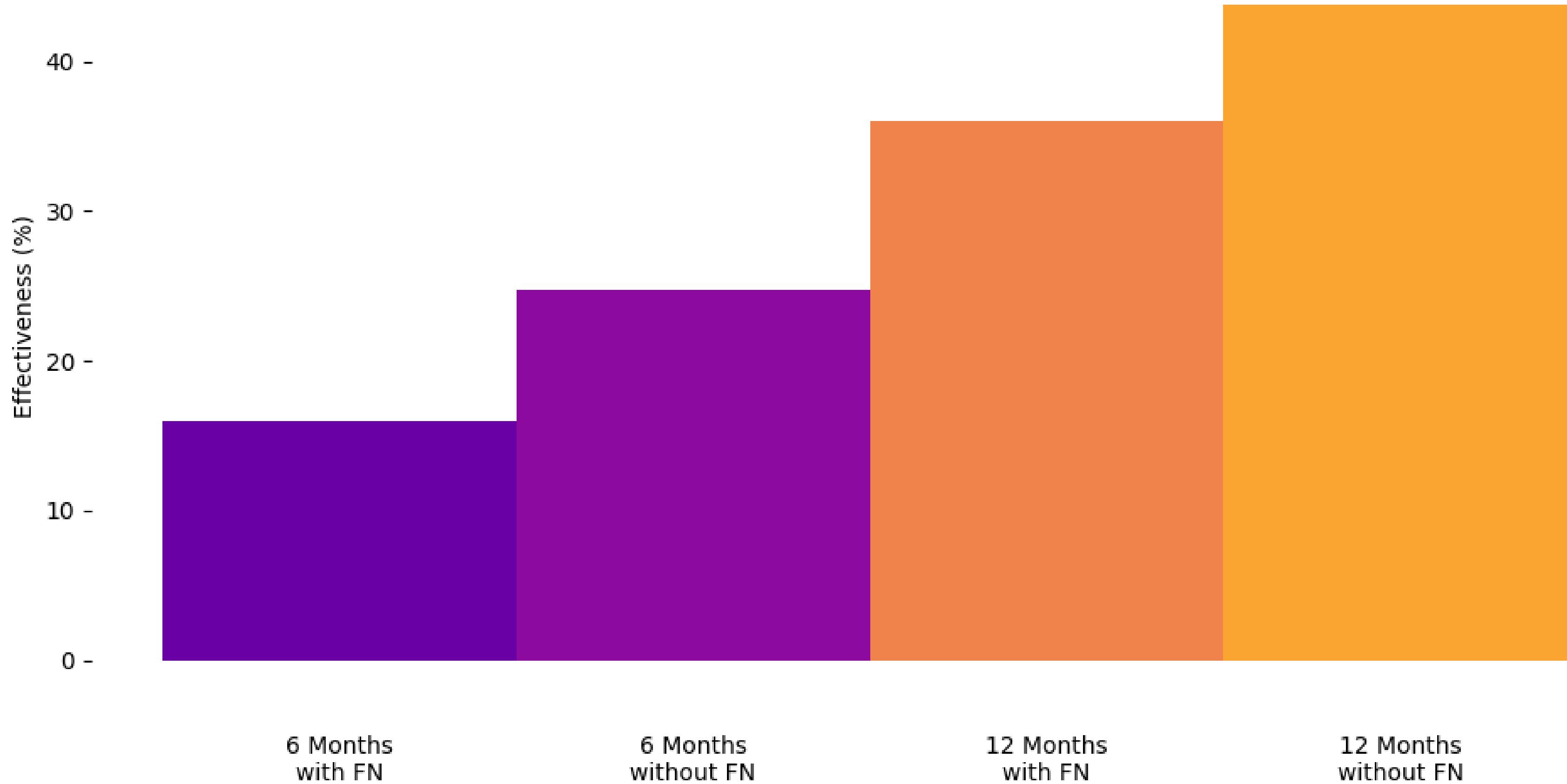


QUESTION 4.1

Is there any connection between help seekers having **functional needs or not** and whether the **interventions are successfully resolved** or not within a long enough period of time (6 months and 12 months)?

6_months_with_fn	6_months_without_fn	12_months_with_fn	12_months_without_fn
16.0	24.7	36.0	43.8

Effectiveness with and without Functional Needs Over Time

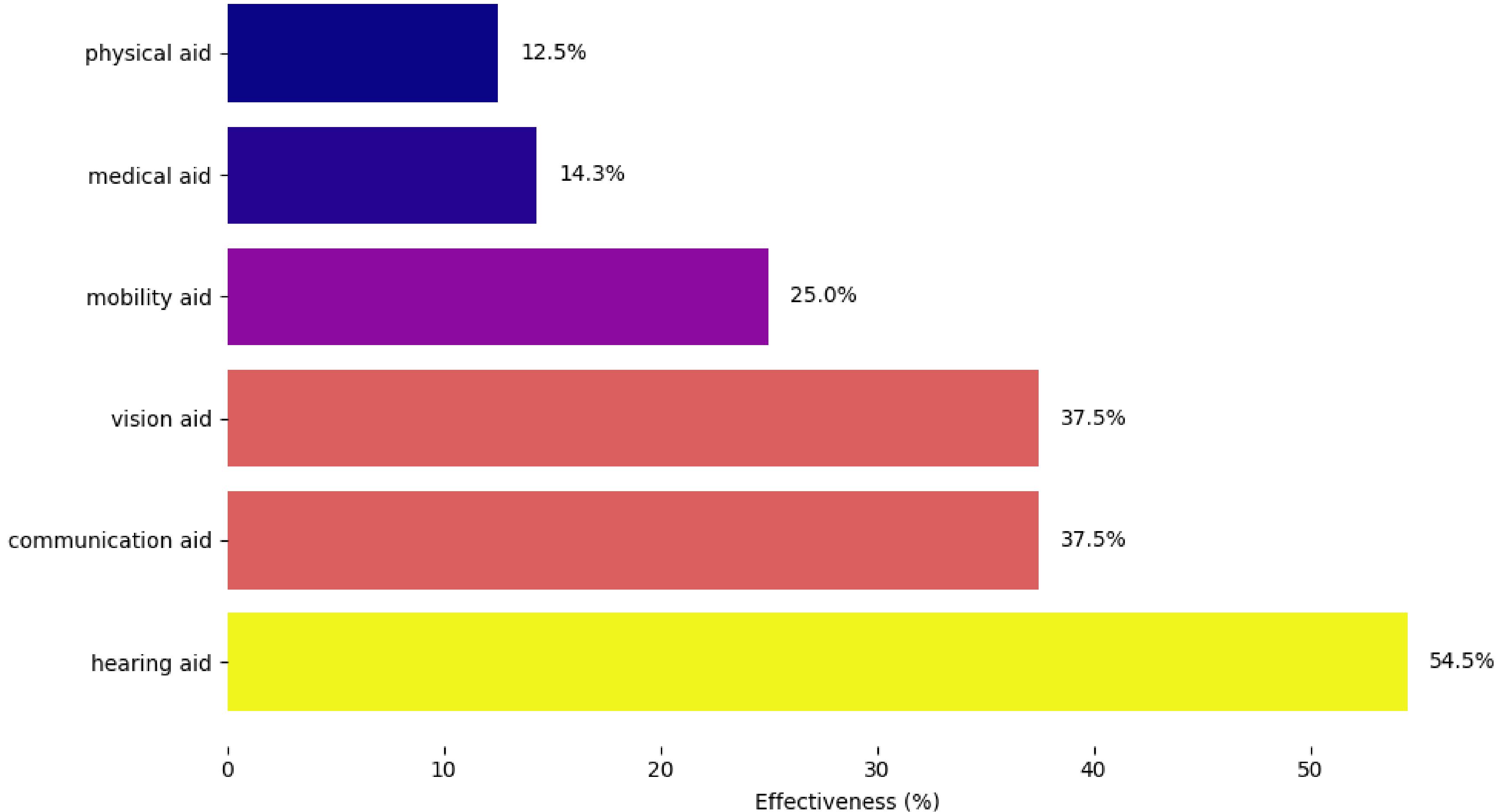


QUESTION 4.2

Are there any correlations between **what the help seeker's functional needs are** and whether the **interventions are successfully resolved** or not within a long enough period of time (12 months)? For each kind of functional need of help seekers, what are the percentage of the interventions being effective, order from least percentage of effectiveness to most?

functional_need_name	effective_12_months
physical aid	12.5
medical aid	14.3
mobility aid	25.0
communication aid	37.5
vision aid	37.5
hearing aid	54.5

Effectiveness of Each Functional Need Over 12 Months



QUESTION 5

For each location, what type of **violence** happens and how many incidents? For each location and violence pairing, list the **number of incidents** in descending order.

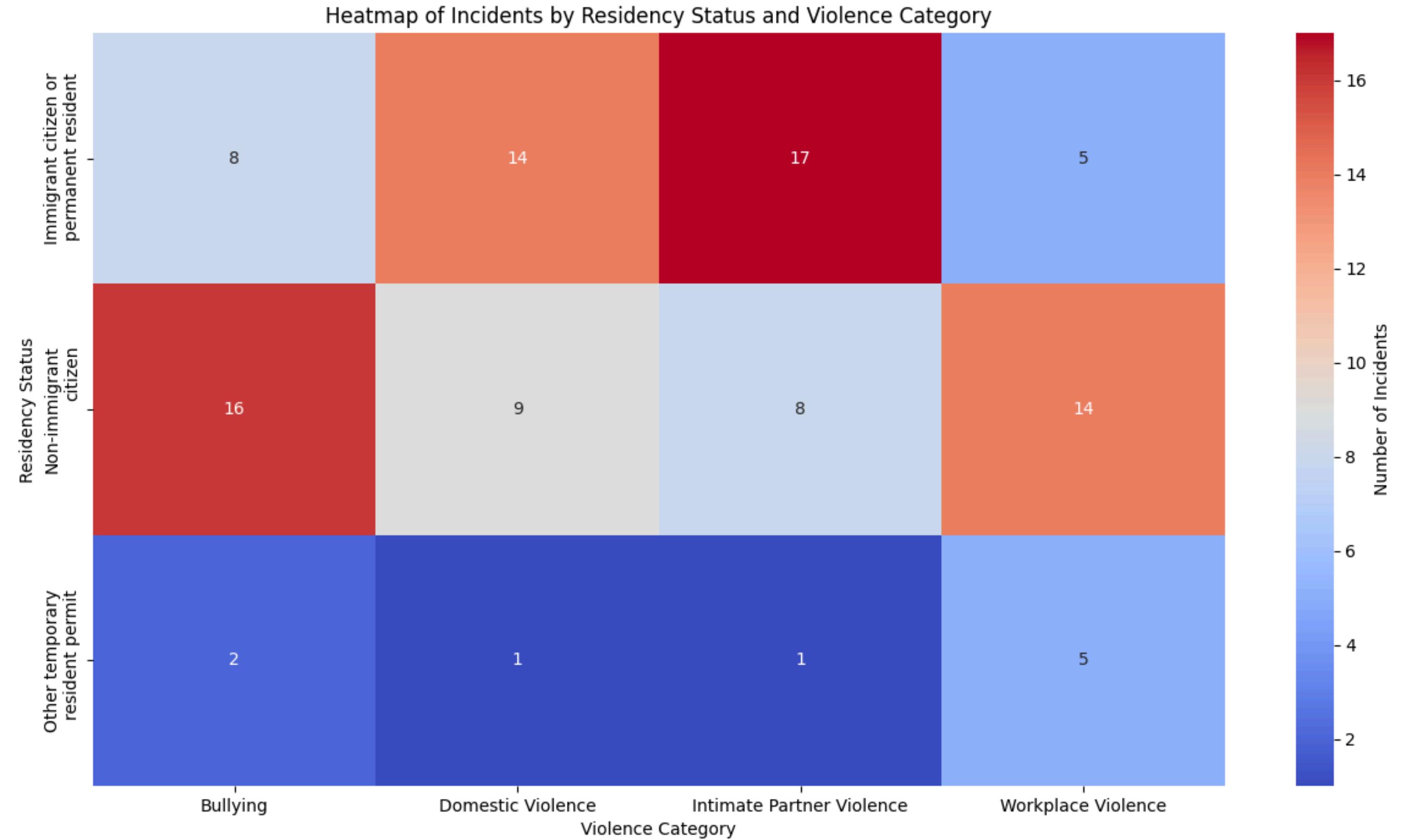
location	violence_category	num_incident
Vancouver	Domestic Violence	7
Vancouver	Workplace Violence	7
Vancouver	Intimate Partner Violence	6
Surrey	Domestic Violence	5
Surrey	Workplace Violence	5
Vancouver	Bullying	5
Surrey	Bullying	4
Richmond	Intimate Partner Violence	4
Burnaby	Bullying	4
Surrey	Intimate Partner Violence	3



QUESTION 6

For help seekers with different **residency status**, what kind of **violence** do they face the most? Show the number of incidents that happen for different pairs of residency status and violence categories. Which pair experiences the most violent incidents?

residency_status_category	violence_category_name	num_incident
Immigrant citizen or permanent resident	Intimate Partner Violence	17
Non-immigrant citizen	Bullying	16
Immigrant citizen or permanent resident	Domestic Violence	14
Non-immigrant citizen	Workplace Violence	14
Non-immigrant citizen	Domestic Violence	9
Immigrant citizen or permanent resident	Bullying	8
Non-immigrant citizen	Intimate Partner Violence	8
Immigrant citizen or permanent resident	Workplace Violence	5
Other temporary resident permit	Workplace Violence	5
Other temporary resident permit	Bullying	2



CONCLUSION

KEY ACCOMPLISHMENTS

LIMITATION AND IMPROVEMENT

KEY ACCOMPLISHMENTS

1 DATABASE DEVELOPMENT

Planned, designed, and implemented a robust database with 19 entities, holding essential information about help-seekers, volunteers, incidents, and interventions.

2 DATA SIMULATION

Used data from reputable sources as benchmarks to generate realistic mock data with AI, simulating real-world scenarios for analysis.

3 COMPREHENSIVE DOCUMENTATION

Documented the database design and implementation step by step, including the ER diagram, data sources, assumptions, and methods used in data generation.

4 QUERY DEVELOPMENT

Developed SQL queries to address complex questions, providing valuable insights into resource satisfaction, violence statistics, and intervention effectiveness.

5 STORE PROCEDURE DEVELOPMENTS

Developed two stored procedures to use in different stages of the app operations, one to filter out invalid interventions, and another to create matched volunteers with multiple incident needs of a help seeker.

CONCLUSION

LIMITATIONS AND IMPROVEMENTS

LIMITATIONS 1

Limited project time and lack of available datasets led to reliance on AI-generated mock data, requiring extensive manual data cleaning.

Insights may also differ from actual research due to data limitations.

IMPROVEMENTS 1

Devote more time for data collection and cleaning, and seek partnerships with organizations that can provide real-world datasets.

Validate findings against research studies and continuously refine the data generation process for higher accuracy.

LIMITATIONS AND IMPROVEMENTS

LIMITATIONS 2

The data validation used a sample stored procedure; while real-world applications need more complex mechanisms.

IMPROVEMENTS 2

Develop and implement additional features to ensure data input validation and improve the overall functionality. This may include validating correlations between entities, data integrity checks, and even automated error handling, thus providing a better user experience.

CONCLUSION

LIMITATIONS AND IMPROVEMENTS

LIMITATIONS 3

The prototype covers basic features and lacks detailed correlations such as matching languages, volunteer specialties, and capacity in resource allocation.

IMPROVEMENTS 3

Enable more detailed analysis of correlations to offer deeper insights and improve resource allocation and intervention strategies.



THANK YOU!

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APPENDIX

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