Understanding how community-level oral health promotion programs for humanitarian migrants work, for whom, in which contexts, and why: A realist review protocol

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Abstract

Introduction: Humanitarian migrants suffer from poor oral health conditions (e.g., dental caries and periodontitis) due to factors such as their difficult migration journeys, financial limitations, language barriers, and lack of access to dental services. Oral diseases can negatively impact general health and can reduce quality of life. Community-level oral health promotion programs for humanitarian migrants are complex interventions; whether and how they work is highly dependent on the context. This thesis advances a realist review protocol to understand how community-level oral health promotion programs for humanitarian migrants work, for whom, in which contexts, and why.

Methods: Realist review is a theory-driven knowledge synthesis methodology than can be used to evaluate complex public health programs. It uses a heuristic called "context-mechanism-outcome (CMO) configurations" to understand how contexts can impact how participants respond to program resources, leading to the outcomes. We have developed our protocol using Pawson's five stages of realist review: clarifying scope, searching for evidence, appraisal and data extraction, data analysis and synthesis, dissemination.

Results: This thesis includes the following: (i) an introduction and a review of the literature regarding humanitarian migrants' oral health and community-level programs for promoting oral health in these populations; (ii) the foundations of the realist review methodology, as well as a manuscript regarding how to conceptualize 'resources' in realist research; (iii) a manuscript providing the protocol for our realist review; and (iv) a discussion about how to conduct and then make use of the findings of this realist review project.

Conclusion: The findings of this realist review project will help inform the design and adjustment of community-level oral health promotion programs for humanitarian migrants for optimized effectiveness. Realist review is a relatively new methodology for explaining what it is about a program that works, for which subgroups, in which situations, to what extent and why. It aims to account for the complexity of public health programs that is overlooked in conventional evaluations. Realist reviews are increasingly gaining popularity in oral health research; therefore, our protocol can guide oral health researchers in their future projects using this approach.

Résumé

Introduction : Les migrants humanitaires souffrent de mauvaises conditions de santé buccodentaire, tel que les caries dentaires et les maladies parodontales, à cause de facteurs comme leurs trajets de migration difficiles, leurs limitations financières, les barrières de la langue, et le manque d'accès aux services dentaires. Les maladies buccodentaires peuvent avoir un effet négatif sur la santé générale et peuvent diminuer la qualité de vie. Les programmes de promotion de la santé buccodentaire au niveau communautaire pour les migrants humanitaires sont des interventions complexes; si et comment ils sont efficaces dépend du contexte. Cette thèse propose un protocole de revue réaliste pour comprendre comment les programmes de promotion de la santé buccodentaire au niveau communautaire pour les migrants humanitaires fonctionnent, pour qui, dans quels contextes, et pourquoi.

Méthodes : La revue réaliste est une méthodologie de revue de littérature axée sur la théorie. Cette méthodologie de revue peut être utilisée pour l'évaluation de programmes complexes. Elle est basée sur une heuristique qui s'appelle 'les configurations de contexte-mécanisme-résultat'. Cet heuristique aide à comprendre comment les contextes peuvent impacter les façons par lesquelles

les participants d'un programme réfléchissent et répondent aux ressources fournis par le programme, menant aux résultats observés. Nous avons développé notre protocole en utilisant les cinq étapes de la revue réaliste par Pawson, qui sont (i) clarifier la portée; (ii) rechercher des sources de données; (iii) l'évaluation et extraction des données; (iv) analyse et synthèse des données; et (v) dissémination.

Résultats : Cette thèse fournit (i) une introduction et une revue de littérature concernant les problèmes de santé buccodentaire des migrants humanitaires et les programmes au niveau communautaire pour promouvoir la santé buccodentaires de ces populations; (ii) les fondamentaux de la revue réaliste, ainsi qu'un manuscrit concernant la conceptualisation de 'ressources' dans une revue réaliste; (iii) un protocole qui fournit les étapes pour faire un projet de revue réaliste de manière appropriée; et (iv) une discussion à propos du protocole et comment traiter et utiliser les résultats de ce projet de revue réaliste.

Conclusions : Les résultats de ce projet de revue réaliste aideront à informer la conception et l'implémentation des programmes de promotion de la santé buccodentaire au niveau communautaire pour les migrants humanitaires avec une efficacité optimale. La revue réaliste est une méthodologie relativement nouvelle pour expliquer ce qui fonctionne dans un programme, pour quels sous-groupes, dans quelles situations, dans quelle mesure, et pourquoi. Cette méthodologie vise à tenir compte de la complexité des programmes de santé publique, qui est négligée par les méthodologies conventionnelles d'évaluation. Les revues réalistes sont de plus en plus populaires dans la recherche de santé buccodentaire. Notre protocole peut guider les chercheurs qui sont intéressés par cette méthodologie à l'utiliser dans leurs futurs projets.

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Contribution to original knowledge

This thesis provides a methodological manuscript explaining the concept of "resources" in realist research and how it might be conceptualized (manuscript 1), and a protocol for Migrant Oral Health Program (MOHP)'s realist review project that aims to explain how community-level oral health promotion programs for humanitarian migrants work, for whom, in which contexts, to what extent and why (manuscript 2). Manuscript 1 uses the concept of resources to clarify how elements of context, mechanism, outcome, and their interactions can be conceptualized and operationalized in realist research, which remains confusing for many novice realist researchers. Manuscript 2 provides the principles and steps for conducting our realist review on community-level oral health promotion programs for humanitarian migrants. This will be used to guide the team and its future researchers to carry out the realist review project in accordance with the realist principles of research.

Author contributions

Manuscript 1:

I (NE) conceptualized and drafted this methodological manuscript. MEM and BN critically reviewed and revised the manuscript. All authors have approved the final version of the manuscript.

Manuscript 2:

MEM and BN conceptualized the study. NE and NSN developed and piloted the search strategies. NE designed and drafted the realist review protocol, which was critically reviewed and revised by MEM, NSN and BN. All authors have approved the final version of the manuscript.

Chapter 1 – Introduction

(Please note: This thesis follows the manuscript format and thus some information and details may be repeated in different chapters.)

Humanitarian migrants, including refugees, asylum seekers and internally displaced persons, are people who forcibly flee from their place of residence due to reasons such as war, conflict, and violation of human rights (IOM, 2020; Robinson, 1953; UNHCR, 2020c). There were 82.4 million humanitarian migrants worldwide at the end of 2020, including 26.4 million refugees, 4.1 million asylum seekers and 48 million internally displaced persons (UNHCR, 2021a). These numbers are constantly increasing; despite the movement restrictions of the COVID-19 pandemic, and the international plea for a ceasefire around the world that would facilitate the COVID-19 response, forced displacement has continued to grow since 2020 (UNHCR, 2021b). Consequently, as of now, more than one percent of the world's population (1 in 95 people) is now forcibly displaced, compared to the ratio of 1 in 159 in 2010 (ibid).

Humanitarian migrants arrive in host countries from long harried journeys during which they might have been refused entry to many countries or states (Keboa et al., 2016; UNHCR, 2021a). Their health conditions are often compromised due to trauma, stress, financial barriers, and unsanitary living conditions, such as in refugee camps which may lack clean water and sanitation (Kateeb et al., 2020; Macdonald et al., 2019). Their geographic mobility pre and post-migration during long periods of time limits their access to health and dental care (Gushulak & MacPherson, 2006). These factors also contribute to poor oral health conditions in these populations. Upon arrival in host countries, access to dental care is further complicated by cultural and linguistic barriers, financial

challenges and legal status, contributing to poorer oral health conditions in these populations (Kateeb et al., 2020; Keboa, 2018; Macdonald et al., 2019).

Good oral health enables individuals to speak, chew, smile, and enjoy life (Kateeb et al., 2020; WHO, 2020b). Oral diseases such as caries and periodontal diseases can cause systemic diseases such as diabetes and cardiovascular diseases through the common risk factor mechanism (Linden et al., 2013). Oral health problems and orofacial pain can significantly compromise the quality of life of humanitarian migrants (Sheiham, 2005). Oral health promotion and oral disease prevention are a necessity for humanitarian migrants who often already have fragile health and poor quality of life (Keboa et al., 2016; Macdonald et al., 2019).

Community-level oral health promotion programs have been implemented to address humanitarian migrants' oral health needs. These programs can be categorized into three overarching categories: (i) oral health education programs; (ii) dental service provision programs, and (iii) community oral health worker (COHW) programs (Keboa et al., 2016).

Oral health education programs aim to improve the oral health knowledge of humanitarian migrants, allowing them to practice oral health self-care and to seek and navigate dental services (Keboa et al., 2016). An example includes a multilingual oral health DVD for refugees in New South Wales, Australia, to reinforce the importance of oral health behaviors in this population (Gunaratnam et al., 2013). Another program provided educational lectures accompanied with group discussions with respect to preventive oral health care at home for refugees at the Refugee Education and Training Center in the United States (Kamimura et al., 2017).

Dental service provision programs involve provision of dental services, such as dental treatments and extractions, by volunteer dentists, dental students, or non-governmental organizations (NGOs)

(Fox & Willis, 2010; Htoon & Mickenautsch, 2000; Singh et al., 2008b). An example involves the restoration of the lower anterior teeth extracted during childhood rituals of Dinka and Nuer refugees residing in the United States (Fox & Willis, 2010).

In settings such as refugee camps where available dental workforce might be insufficient, community oral health worker (COHW) programs have been designed and implemented (Keboa et al., 2016). These programs train humanitarian migrants in oral health care education and basic dental services, preparing them as community oral health workers to provide oral health education and basic dental services for their own community members (Htoon & Mickenautsch, 2000; Keboa et al., 2016). COHW programs also aim to increase the acceptability of the interventions by training an oral health worker from the same community (Gibbs et al., 2015). An example involves a COHW program in the Gomoa camp for Liberian refugees in Ghana, which provided training for selected refugee members to provide basic dental services for their own community (Ogunbodede et al., 2000).

While traditional quantitative methods can be used to understand the biomedical aspects of interventions, such as a medication's mechanism of action, these methods may be inadequate for understanding how community-level oral health promotion programs work because these programs are complex interventions (Pawson et al., 2005b). These programs are implemented in complex and ever-transforming systems, and their success depends on human agency and reasoning (Pawson, 2006b). For instance, whether an oral health promotion program can improve the oral health of its recipients depends on how those recipients process and respond to the program resources (Westhorp, 2014). These human responses to program resources are conditioned by the contextual factors undergirding these programs, including the features of individuals, their interrelationships, institutions, the infrastructure of systems, and the way a program is

implemented (Pawson et al., 2004; Pawson & Manzano-Santaella, 2012). As a result, the same program can yield different outcomes in different contexts.

Traditional methods used for evaluating programs, such as traditional Cochrane systematic reviews and meta-analyses, emphasize the effectiveness of a program; that is, the relationship between an intervention and its outcome. Such an approach is, however, inadequate to inform program design and implementation for the following reasons. First, traditional Cochrane systematic reviews and meta-analyses are rigid and inflexible methodologies, aiming to pool results of studies of programs altogether, while as suggested above, a program is never implemented in the exact same manner everywhere (Pawson et al., 2004). Second, these approaches overlook the essential role of contextual factors; that is, how contextual factors undergirding a program impact how participants respond to the program resources and lead to intended and unintended outcomes (Jagosh, 2019). Third, these approaches focuses on average effect size and therefore exclude outlier cases and miss how the program worked for them (Wong et al., 2013). Implementing a program that would effectively improve humanitarian migrants' oral health conditions requires a deeper understanding of how contextual factors impact humanitarian migrants' reasoning in response to the program, leading to the outcomes.

The purpose of this study is to understand how community-level oral health promotion programs for humanitarian migrants work, for whom, in which contexts and why. My thesis project involves a methodological manuscript reflecting on one particularly challenging concept in realist research – resources – and a protocol for a realist review for this project.

Chapter 2 – Literature review

In this chapter, I introduce and define the concepts that are used in my thesis work. Then I state the problem at hand and the purpose of my study.

2.1 Humanitarian Migrants

Migrant is an umbrella term which refers to people who move away from their usual place of residence, either within a country or across an international border, irrespective of their reason for migration or their legal status (IOM, 2020). **International migrants** are migrants who move across international borders to another country, while those who move within a country or jurisdiction are called **internal migrants** (IOM, 2020).

The term **humanitarian migrants** covers both internal and international migrants who are forcibly displaced from their habitual place of residence, are in vulnerable conditions and need urgent protection (IOM, 2020). Humanitarian migrant populations include refugees, asylum seekers, and internally displaced persons.

There were approximately 82.4 million humanitarian migrants globally at the end of 2020, including 20.7 million refugees, 4.1 million asylum seekers, and 48 million internally displaced persons (UNHCR, 2020b). As of 2020, 1 in every 95 people in the world had been forcibly displaced (UNHCR, 2020b). These numbers are constantly on the rise; 11.2 million new displacements have occurred in 2020 (UNHCR, 2021a). This is while an increasingly less number of displaced people can return to their homes due to their homelands' increasing insecurity and lack of life opportunities and services; in 2020, only 3.4 million displaced persons were able to return to their homes, which is 40% less than in 2019 (UNHCR, 2021a). Moreover, resettlement of these populations declines every year; in 2020, only 34,400 refugees were able to resettle in

host countries, 69% less than the number of refugees resettled in 2019 (107,800) (UNHCR, 2021a). This is while an estimated number of 1.4 million refugees were in need of resettlement in 2020 (UNHCR, 2021a). Therefore, a high number of humanitarian migrants spend long periods in displacement or in temporary residences such as refugee camps and shelters (UNHCR, 2021d).

Refugees are people who have fled from their country of origin to another country due to climate change, war, conflict and violence (UNHCR, 2020c). They are not able or willing to return to their home countries owing to natural disasters or a fear of persecution for reasons such as their race, nationality, religion, political opinion or membership in a social group (Robinson, 1953). There have been 20.7 million refugees worldwide as of 2020 (UNHCR, 2020b). More than 85% of the world's refugee population resides in developing countries, with approximately 70% of these populations living in neighboring countries (UNHCR, 2020b).

Asylum seekers are people who have fled their countries due to fear of persecution and have already submitted claim for refugee status, requesting the right to receive legal protection and assistance from a host country, and are awaiting a response (IOM, 2020). In Canada, the official terminology is "refugee claimants" and "asylum claimants" (Canada, 2020). Not every asylum seeker will eventually receive the refugee status, and so may be forced to return to their country of origin (IOM, 2020).

Internally displaced persons are those who are forcibly displaced within a country to avoid conflict, violence and persecution; they do not cross an internationally-recognized border to another country (IOM, 2020). Even if their country's government is the reason for their displacement, these people remain under their government's control. They often move to areas where providing humanitarian assistance is challenging and are thus among the most vulnerable of migrant populations (UNHCR, 2021c).

Some humanitarian migrants fit under the category of **Undocumented migrants**, those who enter another country or state without the required immigration documents or the legal authorization to enter. Undocumented migrants are also referred to as "irregular migrants" and "undocumented immigrants." While humanitarian migrants can have undocumented status in certain cases, not all undocumented migrants are humanitarian migrants. Migrants can have undocumented status but not be humanitarian; for instance, when an immigrant loses their legal status after the expiration of their immigration documents.

2.2 Oral health

Drawing on the definitions of World Health Organization (WHO) and World Dental Federation (FDI), we define **oral health** as a state of (i) being free from a range of oral diseases and conditions in the mouth, (ii) having a craniofacial complex that functions such that the individual can do activities such as speaking, chewing and smiling without pain and discomfort, and (iii) oral health related mental and social well-being and the ability to enjoy life (FDI, 2016; WHO, 2020b). Common oral diseases include dental caries, periodontal diseases, orofacial trauma, and oral cancer (WHO, 2020b). These diseases are largely preventable through measures such as community water fluoridation, oral health education, smoking prevention and reducing dietary intake of sugars (Petersen et al., 2005)

Oral health is integral to general health; good oral health enables people to grow, speak, eat a variety of foods, communicate effectively, and contributes to self-esteem and social wellbeing (Locker, 1997; Watt, 2005). Poor oral health can lead to complications beyond the mouth (Petersen et al., 2005). Oral diseases share common risk factors with several non-communicable diseases (NCDs) (Sheiham & Watt, 2000); some of these risk factors include smoking, alcohol, diet, and

stress (Sheiham & Watt, 2000). Oral diseases such as periodontal problems are associated with systemic diseases such as diabetes, cardiovascular diseases such as infective endocarditis, and bacterial pneumonia (Dörfer et al., 2017; Li et al., 2000) Moreover, oral diseases can negatively impact quality of life and psychosocial wellbeing (Sheiham, 2005). For instance, dental diseases can lead to pain, discomfort, disfigurement, impaired eating and sleeping, and loss of school and work days (Sheiham, 2005; Watt, 2005).

Oral diseases can also be of economic burden for the individual and society (WHO, 2020b). Treating oral diseases is costly; in many countries, oral diseases are the among the most expensive conditions to treat (Listl et al., 2015). In some low-income countries, the costs of providing conventional dental treatment might exceed the country's overall healthcare budget (Xu et al., 2019). Promoting oral health and preventing oral diseases can thus be an appropriate way to ensure good oral health and therefore improve the overall health of the society.

According to the Ottawa Charter, **oral health promotion** can be defined as the process of empowering people to enhance their control over and to improve their oral health (WHO, 2020a, 2020c). The Ottawa Charter for health promotion emphasizes the role of social justice and equity in health and rendering biological, behavioral, social, cultural, environmental, political, and economic factors favorable to improvements in health. It aims to empower individuals and societies to take control of their own health by enhancing opportunities and resources for them to make healthy choices. Health promotion action can involve applying health to public policy, creating supportive environments, strengthening community action, supporting the development of personal skills, and reorienting health services. All these principles apply to oral health promotion as well. Some oral health promotion approaches include water fluoridation, topical

fluoride therapy, oral health education, and provision of dental services or facilitating people's access to them (Petersen & Kwan, 2004; Satur et al., 2010; Watt, 2005).

Oral health promotion programs are those designed and implemented to improve the oral health and prevent oral diseases in the target population. These programs can be considered **community-level** if they target a community rather than an individual. For instance, an oral health promotion program targeting the refugee community living in Montreal (Canada) can be considered at the community-level.

2.3 Humanitarian migrants, health, and oral health

Humanitarian migrants often have poorer health and oral health conditions compared to other populations in their host countries (Keboa et al., 2016). Having fled war, violence and discrimination, humanitarian migrants often arrive in their host countries with a significant health burden and high rates of trauma and stress (Palinkas et al., 2003). Before arrival, humanitarian migrants may have had limited or no access to health and dental services for extended periods; further, they may have been subject to torture (Gushulak & MacPherson, 2006). Furthermore, they may arrive with diseases endemic to their homelands, such as tuberculosis and malaria, which can further complicate their health conditions (Palinkas et al., 2003).

During migration, humanitarian migrants' geographic mobility may further complicate their access to health and dental services (Gushulak & MacPherson, 2006). Traumatic and stressful migration journeys can further deteriorate their physical and psychological conditions (Palinkas et al., 2003) Many are obliged to reside in temporary accommodation during their perilous migration journeys, such as in refugee camps, where unsanitary living conditions are common, clean food and water can be lacking, and health workforce can be limited (Kateeb et al., 2020; Keboa, 2018).

Within these circumstances, treatment of acute and infectious diseases often has a higher priority than NCDs and oral diseases (Amara & Aljunid, 2014) and emergency treatments such as tooth extraction are more common than restorations and preventive treatments (Ogunbodede et al., 2000; Roucka, 2011).

Upon arrival, humanitarian migrants' oral health conditions can be further complicated by factors such as language barriers, legal status, lack of dental care coverage, and unawareness of the oral health services that are available to them (Kateeb et al., 2020; Macdonald et al., 2019). In certain host countries, oral health services are costly and have long waiting times, further limiting humanitarian migrants' access to oral health services (Kateeb et al., 2020; Keboa et al., 2016) Additionally, some humanitarian migrants may have fear and anxiety regarding dental services, due to fear of deportation, discrimination, or prior experiences of trauma and torture (Kateeb et al., 2020; Mattila et al., 2016; Singh et al., 2008a)

Humanitarian migrants may have urgent needs, such as food, water and resettlement, which can conceal their oral health conditions (Kateeb et al., 2020). In certain situations, humanitarian migrants may have even limited or no access to healthcare services, leading them to seeking healthcare primarily in emergency situations (WHO, 2018). Within such circumstances, accessing oral health services may become even more challenging. Oral health promotion interventions need to be implemented for this vulnerabilized population to address their oral health needs, prevent the further deterioration of their oral health status and oral health related quality of life, and enhance their health and wellbeing for starting a new life and integrating in the host society (Keboa, 2018; Macdonald et al., 2019).

2.4 Community-level oral health promotion programs for humanitarian migrants

Community-level oral health promotion programs involving several types of interventions have been implemented to improve the oral health of humanitarian migrants. As described above, these programs include (i) oral health education programs; (ii) dental service provision programs; and (iii) COHW programs. To date in the literature, these programs are reported to target humanitarian migrant adults (Zimmerman et al., 1993), caregivers (Alrashdi et al., 2021; Gibbs et al., 2014), children (Hamid et al., 2021), and the elderly (Nurelhuda et al., 2021). Strategies have been used to improve the effectiveness of these programs, which may include training humanitarian migrants themselves to deliver these interventions (Gibbs et al., 2014; Ogunbodede et al., 2000; Roucka, 2011), developing cultural competency in program deliverers (Muller, 2016), and using interpreters or translated materials to account for language barriers (Alrashdi et al., 2021; Gunaratnam et al., 2013; Zimmerman et al., 1993).

Oral health education programs provide oral health knowledge for humanitarian migrants so that they can practice oral health self-care behavior and seek dental services (Keboa et al., 2016). In these programs, dentists, dental specialists (e.g., pediatric dentists) (Hamid et al., 2021), dental students (Muller, 2016), or members of the humanitarian migrant community(Gibbs et al., 2014) may act as community oral health educators.

The information provided in these programs may involve the importance of oral health (Gibbs et al., 2014; Hamid et al., 2021), causes of oral diseases, their consequences, and ways to prevent them (Gibbs et al., 2014; Hamid et al., 2021; Kamimura et al., 2017; Muller, 2016), diets for maintaining oral health and preventing oral diseases (Gibbs et al., 2014; Kamimura et al., 2017;

Zimmerman et al., 1993), oral care practices (e.g. toothbrushing methods and their intervals) (Gibbs et al., 2014; Kamimura et al., 2017; Muller, 2016; Zimmerman et al., 1993), importance of dental visits (Kamimura et al., 2017), and advice and information for navigating the dental services of the host country (Gibbs et al., 2014).

Methods of delivering oral health knowledge in these programs involve published materials (brochures, handouts) (Alrashdi et al., 2021), multimedia (e.g., videos) (Gunaratnam et al., 2013; Hamid et al., 2021), in-person individual or group presentations and sessions (Gibbs et al., 2014; Kamimura et al., 2017; Muller, 2016; Zimmerman et al., 1993), group discussions (Gibbs et al., 2014; Zimmerman et al., 1993), and training community oral health workers and other peer educators to deliver oral health messages (Gibbs et al., 2014).

To illustrate a range of activities and global areas, examples of oral health education programs for humanitarian migrants are as follows:

- In 1992, an oral health education program was provided for Chilean refugees in Stockholm, Sweden (Zimmerman et al., 1993). The program provided baseline examinations of refugees' oral health status. Instructional sessions using slide presentations were held to teach oral hygiene measures (e.g., toothbrushing and flossing) to participants. The slides were used to explain the relationship between diet and dental caries and between dental hygiene practices and periodontal health. The slide presentations were followed by group discussions. Some participants received one and some received two instructional sessions. Rudimentary prophylaxis (mainly scaling) was provided for participants during the first visit.

- In 2013, a multilingual DVD providing culturally and linguistically appropriate information about oral health behaviors was provided to a diverse group of refugees in New South Wales, Australia (Gunaratnam et al., 2013). In this DVD, community members were used as actors who delivered oral health messages in an entertaining and humorous manner. An evaluation of the DVD showed that refugees' oral health knowledge improved, even though the frequency of their dental visits did not change.

- In 2016, an oral health education program was implemented for humanitarian migrants in St Louis, Missouri, United States, aiming to improve their oral health literacy and perceptions (Muller, 2016). The intervention involved 50-minute PowerPoint presentations, involving visual demonstrations and hands-on activities, such as hands-on education of correct ways of toothbrushing and flossing.

- In 2017, an oral health-mental health integrated program was provided for post-war Syrian displaced children in Damascus, Syria (Hamid et al., 2021). These children lived in overcrowded and unhealthy living conditions, malnutrition, and psychological uncertainty. The program consisted of 12 sessions over 6 weeks, including 8 sessions for psychosocial support and 4 sessions of oral health education. Sessions lasted between 60-90 minutes and consisted of integrated activities such as playing, drawing, acting and relaxation. Oral health education methods involved presentations, videos, illustrations and storytelling. The oral health sessions focused on oral diseases, their impact on general health and ways to prevent them, importance of oral health for general health, importance of periodic oral health checkups, treatment tools and procedures, stages of teething, and dental appearance.

The psychosocial support sessions focused on trauma healing, open discussion about children's social problems, friendly behavior, and positive vision about the future.

- In 2019, an oral health education program entitled "Share the same smile" was developed and established by New South Wales refugee health services for newly arrived refugees and asylum seekers in Australia (Sestakova et al., 2019). This program focused on the effect of lifestyle behaviors on oral health, early intervention and prevention, and improving knowledge of and access to public dental services. This program employed bilingual community educators to improve the effectiveness of these programs. The languages covered included Arabic, Assyrian, Burmese, English, Dari, Farsi, Karen, Rohingyan and Tamil. Presentations were conducted using pictorial graphics to improve oral health understandings, followed by participant discussions. The topics involved the importance of a healthy mouth for a healthy body, tooth decay, importance of eating well and drinking tap water, teeth of babies and young children, how to clean teeth, hazards of smoking, the importance of seeing a dentist, and how to access public dental health clinics. The intervention followed with a supporting pamphlet called "keep your mouth healthy" which was translated into the eight refugee languages.

- In 2020, an education program aimed to improve the oral health knowledge, attitudes, and behaviors of children and caregivers in refugee families in Bexar County, San Antonio, Texas (Alrashdi et al., 2020). Five education sessions were held for the caregivers using volunteers from the refugee community because they had a better understanding of the

refugee experience. The program providers were bilingual and received cultural competency training. During the educational sessions, interpreter services were used.

The oral health education interventions included instructions, demonstrations using colored visuals, and motivational interviewing. The instructions emphasized the importance of fluoride, oral hygiene, nutrition, oral health, consequences of bad oral health, and access to dental services. Demonstrations included flossing, brushing teeth, and using mouthwashes. Toothbrushes, toothpastes, flosses, and educational brochures were provided for participants after the sessions.

Oral health education materials were developed in a culturally and linguistically appropriate manner with the input from interpreters and refugee volunteers and were translated into the native language of each family.

Two education guides were provided in this program:

1. "A healthy mouth for your baby" – a brochure provided for caregivers discussing oral health in young children. Topics involved the importance of primary teeth, role of fluoride and oral hygiene in preventing tooth decay, checking and cleaning teeth, feeding and nutrition, and importance of having a dental visit in the first year of life.
2. "Healthy habits for happy smiles" – a series of handouts for promoting good oral health in pregnant women and parents of infants and young children.

Dental service provision programs involve provision of free or reduced-fee dental care by volunteer or remunerated dentists, dental students, and dental hygienists, sponsored by governmental or non-governmental organizations (Capozzi et al., 2018; FDI, 2021; Fox & Willis, 2010; Koleilat, 2021). These programs aim to address the oral health problems of humanitarian

migrants and provide them with the dental care they need. Interventions include preventive care (e.g., sealants, Silver Diamine Fluoride), restorative care (e.g., fillings, dental prostheses), and emergency care (e.g., tooth extractions) (Capozzi et al., 2018; Koleilat, 2021; Melvin, 2006). Complex cases which cannot be managed using the abovementioned techniques are usually referred to other centers with free or reduced-fee services (FDI, 2021; Melvin, 2006). Mobile dental units or temporary dental clinics have also been used in situations such as in refugee camps (Htoon & Mickenautsch, 2000).

Dental service provision programs implemented in situations with limited workforce and equipment, such as in **refugee camps**, might differ from those implemented in resource-rich circumstances. Treatments provided in these situations usually include non-invasive dental procedures that do not require sophisticated equipment, such as the Hall technique, silver diamine fluoride, and Atraumatic Restorative Treatment (ART) (Htoon & Mickenautsch, 2000). The Hall technique is a non-invasive method for managing caries in primary molar teeth using preformed metal crowns (Altoukhi & El-Housseiny, 2020). ART is a non-invasive technique for managing caries which involves removing decayed tissue from the teeth using only hand instruments and filling the cavity with adhesive materials (Frencken et al., 1996). For instance, ART may be suitable for circumstances in which there is no electricity (Htoon & Mickenautsch, 2000). Due to lack of equipment and dental materials, treatments might be more focused on symptom relief and teeth may be extracted in refugee camps instead of restorations or referrals to other centers (Htoon & Mickenautsch, 2000; Kateeb et al., 2020).

An example of dental service provision programs is the UNHCR's dental care program, which incorporates dental students from Ain Shams University, Cairo, to provide oral health care for Sudanese refugees living in Egypt (UNHCR, 2020a). A Syrian refugee dental health project has

also been implemented to reach 750 children and families in a refugee settlement in Akkar district in the North of Lebanon (ANERA, 2021); dentists come to camps to conduct dental screening and refer those in need of more complex treatments to a credible clinic to receive free care.

Another program that was implemented in 2010 provided dental restorations for Dinka and Nuer refugees in Nebraska, United States, whose lower anterior teeth had been removed through traditional cultural practices during childhood (Fox & Willis, 2010). These dental restorations improved Dinka and Nuer refugees' distress levels, allowing a better cultural integration in their host community (Fox & Willis, 2010).

Community Oral Health Worker (COHW) programs are those aiming to train humanitarian migrants themselves as community oral health workers. Once trained, the COHW would in turn provide oral health education or basic dental services for their own community (Keboa et al., 2016). These programs are usually implemented in circumstances where there is lack of workforce, equipment, and resources, such as in refugee camps (Htoon & Mickenautsch, 2000; Keboa et al., 2016). Furthermore, while drawing on external dental workforce can be beneficial for addressing the oral health needs of the refugee population, employing oral health workers who have the same cultural background and speak the same language as the refugee community might improve the effectiveness of these populations (Htoon & Mickenautsch, 2000). These programs are also employed in the stable phase of a refugee camp, when the external dental professionals volunteered or remunerated to provide dental services in the emergency phase are no longer available (Htoon & Mickenautsch, 2000).

These programs usually involve an initial oral health assessment to adapt the educational material and clinical interventions to the needs of the refugee camp (Htoon & Mickenautsch, 2000; Ogunbodede et al., 2000; Roucka, 2011). The educational materials for training COHWs usually

involve techniques for assessing oral health status (e.g. surveys), oral health promotion, emergency oral health care, and non-invasive restorative techniques such as ART that do not require sophisticated equipment (Htoon & Mickenautsch, 2000; Ogunbodede et al., 2000; Roucka, 2011).

The responsibilities of trained COHWs may include (i) managing equipment and infection control; (ii) assessing oral health status, taking patient histories and medical records; (iii) perform uncomplicated treatments such as simple extractions, prescribing medications, non-invasive curative procedures such as ART, and dental cleaning; and (iv) promote oral health through oral health instruction and education (Htoon & Mickenautsch, 2000). COHWs can also refer patients to dental centers located outside the camp for complex treatments that are outside the COHWs' expertise (Htoon & Mickenautsch, 2000; Ogunbodede et al., 2000; Roucka, 2011)

Examples of COHW programs for humanitarian migrants include the following:

(i) A program in the Gomoa Buduburam camp in Ghana for refugees from Liberia provided a 10-week training course regarding basic oral health care and oral health promotion for 12 selected refugees (Ogunbodede et al., 2000). The COHWs' activities included assessing the dental treatment needs of the refugee community, providing emergency treatment and restorative treatment using ART, preventive oral health care, and oral health education. The COHW also organized oral health awareness weeks, which aimed to empower participants to take care of their own oral health and that of their children (Htoon & Mickenautsch, 2000; Ogunbodede et al., 2000).

(ii) Drawing on the Gomoa Buduburam camp program, a program in the Mtabila and Nyarugusu camps in Western Tanzania provided a two-week training course in oral health promotion and emergency dental care, followed by a two-week refresher course,

for 12 refugees (Roucka, 2011). The COHWs in turn performed oral health education, basic dental care, and referrals to other dental centers for the refugee camps' members.

Three outcomes may occur for the COHWs after the program has achieved its goals: (i) resettlement in a host country or a repatriation to their country of origin; in either case, integration into their country's dental workforce; (ii) phase-down of oral health care services as the population of the refugee camp diminishes; and (iii) termination of the COHW program (Htoon & Mickenautsch, 2000).

2.5 Statement of the problem

Many community-level oral health promotion programs have been implemented for humanitarian migrants. Their goals are to improve their oral health so that (i) their quality of life is improved; (ii) oral health problems do not aggravate their already fragile health conditions (Keboa et al., 2016; Macdonald et al., 2019). Overall, improving humanitarian migrants' oral health can help ensure that they can integrate better into host countries (Keboa, 2018; Macdonald et al., 2019). However, robust evaluation data regarding these programs are lacking. These programs are complex interventions implemented in complex and dynamic systems (Pawson, 2013; Pawson et al., 1997). The implementation steps of a program is non-linear and may sometimes go in reverse (Pawson et al., 2004); it starts in the minds of program designers, passes on to the hands of managers and service providers and then reaches the program recipients; each of these steps is also affected by the program stakeholders' reasoning, beliefs and decision-making (Pawson, 2000; Pawson et al., 1997). How these elements of reasoning unfold within a particular program is conditioned by the situations within which these programs are implemented, such as the personality characteristics of individuals, institutions, and the infrastructure of the services

(Pawson, 2013; Pawson et al., 1997). Therefore, a program can never be repeated the exact same way, and will inherently lead to different outcomes when implemented in different contexts (Wong et al., 2013).

While randomized controlled trials (RCTs) and traditional Cochrane systematic reviews focusing on effectiveness are considered the gold standard research methods in many disciplines, including dentistry (Petersen & Kwan, 2004; Watt et al., 2001), they are not useful for informing the design and implementation of complex public health programs, such as community-level oral health promotion programs for humanitarian migrants (Jagosh, 2019; Pawson et al., 2004; Petersen & Kwan, 2004). There are a number of reasons to this limitation.

First, RCTs and traditional Cochrane systematic reviews can evaluate whether a program is effective or not; yet, they cannot provide an explanation as to why the program is effective or not, or what it is about it that makes a change in the target population (Pawson, 2006b). Moreover, the binary view of effective versus not effective obscures unintended outcomes and why they occurred.

Second, RCTs, traditional Cochrane systematic reviews and meta-analyses focusing on effectiveness attempt to 'eliminate' context to remove bias (Pawson, 2003, 2006b); further, a meta-analytic review simplifies a program by removing contextual information to enable pooling these programs together, treating them as a singular, linear and constant intervention (Pawson, 2003). In contrast, programs constantly change over time and are never fully similar across different situations; they thus cannot be considered to act as the same intervention everywhere and thus should not be pooled in a meta-analysis (Pawson, 2013; Pawson et al., 2005a; Pawson et al., 1997).

Further, an RCT attempts to adjust for confounders to remove the role of context in a program and thus avoid bias (Pawson, 2006b). However, the real world can never be isolated from contextual factors into close systems (Pawson, 2013). Moreover, the 'hierarchy of evidence' used in the biomedical approach in evidence-based medicine treats context-related data, such as reports, folk theories and opinion pieces, as low-quality evidence (Jagosh, 2019; Pawson et al., 2004, 2005a). Yet, contextual information is necessary for getting a rich picture of what is happening in a program and can be used for adjusting and tailoring the program for optimizing its effectiveness (Pawson et al., 2004, 2005a).

Given the importance of context and the role of program stakeholders' reasoning in shaping programs, it is imperative to develop an understanding of how contexts may impact the reasoning of those involved in the program and how this reasoning leads to the observed outcomes. Given the limitations of approaches such as systematic reviews for answering this question, a novel and innovative approach must be sought that would be capable of providing such an explanation. The realist approach to reviews, which is used in this thesis, provides the tools for achieving this aim.

2.6 Purpose of study

The purpose of this thesis is thus to bring forward realist reviews into program evaluation in dental sciences and oral public health. The thesis advances a protocol for a realist review, aiming to explain how community-level oral health promotion programs for humanitarian migrants work, for whom, in which contexts, to what extent and why.

Chapter 3 – Methodology

This chapter introduces the **realist review methodology**, which can be used as a modality for evaluation of dental public health programs. This thesis provides a protocol using this methodology to advance an understanding of how community-level oral health promotion programs work, for whom, in which contexts, to what extent and why.

Realist philosophy

Many experts from multiple disciplines have contributed to the formation of realist methodology over the last few decades. These people include philosophers (Bhaskar, Campbell), sociologists (Sayer, Merton, Maxwell, Pawson), evaluators (Weiss, Funnell and Rogers) and other disciplines (Tilley, Shaw.) Pawson has listed the names of the contributors to the realist methodology in the realist family tree in his famous book "The Science of Evaluation: A Realist Manifesto" (Pawson, 2013)(Figure 1).

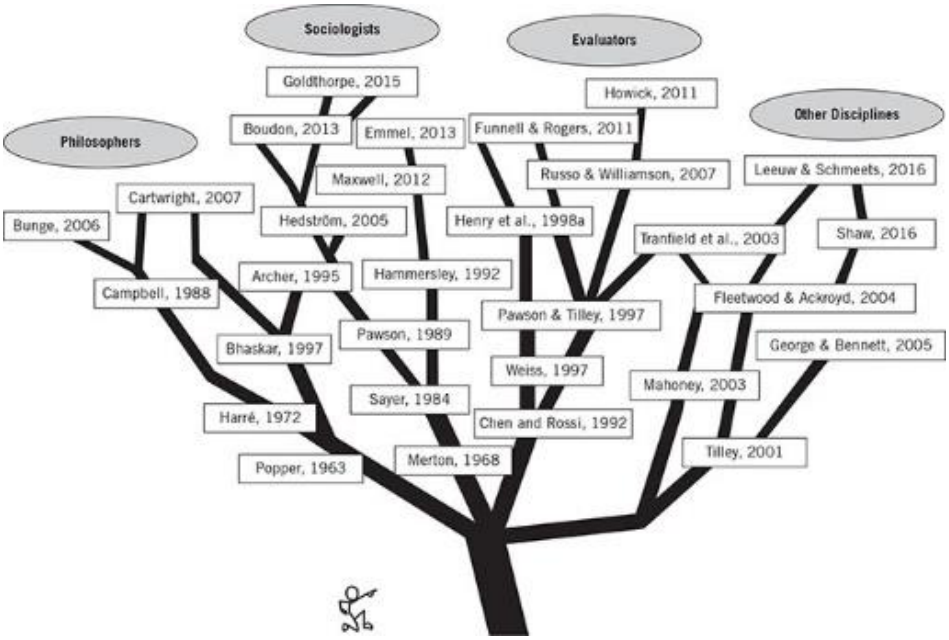

Figure 1 – Realist family tree

For this thesis, I am drawing on Pawson and Tilley's realism, which is an adaptation of the realist philosophy into a methodology used for evaluating complex social and public health programs (Pawson et al., 1997).

Ontology

While realism believes in a single reality, the realist philosophy rejects empiricism, in which only observable events are considered real (Doyal & Harris, 1986; Jagosh et al., 2014). In realism, whether something is real does not depend on whether it is observable (Jagosh, 2019; Westhorp, 2014). **Ontological depth** in realism refers to reality being "stratified in layers" (Bhaskar, 2013; Jagosh, 2019, 2020). According to Bhaskar, the realist philosophy assumes three realms of reality: (i) the empirical, which humans can observe, perceive and sometimes measure; (ii) the actual, which includes the empirical as well as activated mechanisms that are not observable; and (iii) the real, including the empirical and actual, as well as latent mechanisms (not activated or manifested but still real) (Bhaskar, 1997; Jagosh, 2019, 2020).Whether these underlying mechanisms operate is conditioned by the context (Pawson et al., 1997). The idea of **Generative causation** means that these underlying hidden causal mechanisms are activated in conducive contexts, generating the observed outcomes (Bhaskar, 1978; Wong et al., 2014).

Realism is based on the idea of **complexity**; The world is composed of infinite features and events, and while both natural and social systems are patterned, they are inherently and infinitely complex, and no amount of measurement and observation can allow humans to fully explain their order and organization (Bhaskar, 1978; Pawson, 2013).

There are a number of assumptions underlying the idea of complexity in realism. First, realism posits that social systems are **open systems** (Pawson, 2013). They cannot be isolated from each other or kept constant; they constantly interact and impact each other (Pawson, 2013). Bhaskar contends in his idea of critical realism that experimental closure can occur in natural sciences; that is, a laboratory experiment can be isolated from external forces so the scientist can observe whether the intervention is the single mechanism that generates the empirical uniformities (Bhaskar, 1986). Yet, this closure cannot be established in the social world and empirical research can only yield partial descriptions of the social world (Bhaskar, 1978, 1986).

While Pawson agrees with Bhaskar in terms of open systems in social sciences, he disagrees with idea of closed systems in natural sciences, stating that only partial closure can occur in laboratory experiments because natural scientists can never be fully aware of and isolate all externalities in a world that is infinitely complex (Pawson, 2013). A social program is a social system implemented in the milieu of other interrelated social systems; programs therefore cannot be isolated from the effects of the social systems within which they are implemented (Pawson, 2013; Pawson et al., 1997).

Another underlying notion in realism is the idea of **morphogenesis**. The morphogenetic approach, introduced by Archer in 1995 (Archer & Archer, 1995), posits that social systems are everchanging. People's choices in a system are preconditioned by pre-existing structures, institutions and opportunities. These choices create a new social structure, which would then condition other choices and so on. This cycle goes on and on; agency changes the structure of the system and in turn the structure changes people's agency. Society is thus constantly self-transforming, and we can never have full control on these constant changes (Archer, 2011, 2013).

We do not have control over this morphogenetic society because change in a society is unavoidable. Programs are also part of the society and are thus not immune from morphogenesis - they self-transform as well (Pawson, 2013). Since programs are everchanging themselves, we cannot claim that programs are constant entities initiating a change in a constant environment; a program changes the course of change in a dynamic and everchanging society (Pawson, 2013). This is another reason why they can never be exactly reproduced.

Moreover, programs aim to change the decision-making of participants. However, the collective decisions of participants also change these programs and create a new social order (Archer & Archer, 1995). Consequently, programs change the conditions that made them work in the first place (Pawson, 2013). Therefore, programs have a limited life-span and require modifications over time (Pawson, 2013).

Another component in realist philosophy is that a particular program never produces the same outcome everywhere and for everyone. In this regard, Rossi posed the **Iron Law of Evaluation**: "The expected value of any net impact assessment of any large scale social program is zero" (Rossi, 1987). This is because a particular program may trigger different mechanisms in different situations and these *countervailing mechanisms* can cancel each other out (Pawson, 2013). Therefore, Rossi suggests that instead of choosing the most effective intervention and implementing it everywhere, evaluation researchers should follow the iron law, choose the most appropriate tools for its implementation and targeting, and adjust the program for the right participants in the right circumstances (Rossi, 1987).

Epistemology

Whilst the realist philosophy supports the existence of a single reality, it also acknowledges that people's perceptions of that reality are limited because they are processed and constructed through humans' limited senses and brainpower (Westhorp, 2014). The idea of **mind-independent reality** in realism thus implies that reality exists regardless of our knowledge of it (Jagosh, 2019), and that all knowledge of reality is partial and fallible (Maxwell, 2012). Nevertheless, while the outputs of scientific research are never totally equal to reality, empirical data can be continuously used to confirm or falsify these outputs, leading to the refinement of our knowledge (Popper, 1992). The **cumulative** nature of knowledge generation and refinement in realist inquiry, including cycles of theory development and refinement, can increase the proximity of research outputs to reality (Jagosh, 2020; Popper, 1992).

The realist philosophy questions 'objectivity'; realists believe that no amount of evidence will lead us to objectivity (Campbell, 1988). Furthermore, 'procedural uniformity', the idea that inquiry being done in the same manner to the same protocol will lead to reproducibility and therefore objectivity is questioned in realist research (Pawson, 2013). Campbell posits that the so-called 'objectivity' of science stems from a 'social process' in which "a systematic norm of distrust, combined with ambitiousness, leads people to monitor each other for improved validity. Organized distrust produces trustworthy reports" (Campbell, 1988). It is these social processes that drive researchers to the data and lead to inferences from the data (Pawson, 2013). Researchers must thus consider more the quality of reasoning in research than the quality of data itself (ibid).

The realist philosophy also rejects a 'hierarchy of evidence', in which systematic reviews and RCTs are considered the gold standard research methodologies, qualitative research is of low

credit, and tacit 'folk' knowledge is rejected (Jagosh, 2019; Pawson, 2013). As Campbell posits, for a robust program evaluation, there is a need for qualitative knowledge regarding context: "to rule out plausible hypotheses we need situation specific wisdom" (Campbell, 1988). Without this knowledge, our estimates of the program impacts will not be accurate, the conclusions of which can be harmful to the society (ibid).

Methodology:

Generative Causation and Context-Mechanism-Outcome Configurations

Realist research uses a heuristic called '**context-mechanism-outcome (CMO) configurations**' to explain how the context of a program impacts the causal mechanisms through which the outcomes occur (Pawson et al., 1997).

Outcomes: In realism, outcomes are entities or events that are often observable or perceivable (or can be made observable using measures such as quantitative indices) (Westhorp, 2014). These outcomes include intended, as well as unintended outcomes (Pawson et al., 2004).

Mechanism: Mechanisms are underlying causal forces or powers that make events happen (Sayer, 2010; Westhorp, 2014). Pawson and Tilley have defined mechanisms in their realist approach as 'the interaction between program resources and people's reasoning' and 'people's reasoning in response to the program resources' (Pawson et al., 1997).

Mechanisms are often unobservable because they occur in deeper layers of reality than the outcomes they generate (Jagosh, 2019; Westhorp, 2014). For instance, people's reasoning occurs inside their heads which may not be readily observable or perceivable, unlike its outcome (people's behavior). Therefore, uncovering mechanisms requires retroduction, an analytic technique that uses induction (theory generation), deduction (theory testing) and abduction (imaginative

thinking) (Jagosh, 2020). Having to use imaginative thinking to unravel mechanisms does not mean that mechanisms are imaginary; they are real and preexistent, but only operate when the conditions are right (Pawson et al., 1997; Westhorp, 2014).

While realist review is based on Pawson and Tilley's construct of 'reasoning and resources', this construct may be inadequate to account for all causal forces at play; other constructs of mechanism can be used to account for causal forces that do not fit under Pawson and Tilley's construct of mechanism (Westhorp, 2018). These constructs include powers and liabilities, forces, interactions, and feedback and feedforward processes (Westhorp, 2018).

Context: Context is the particular features of the circumstances within which a program takes place that can impact the firing of mechanisms (Greenhalgh et al., 2017). The contextual conditioning of underlying causal mechanisms is what can turn or prevent the turning of causal potentials into outcomes (Pawson et al., 1997). Contexts are not 'things' that can be isolated or reproduced; they are rather dynamic and interrelated 'forces' that determine whether and which mechanisms activate (Greenhalgh & Manzano, 2021). Contexts operate at multiple levels of the social systems and are in constant interaction with each other (Greenhalgh & Manzano, 2021; Greenhalgh et al., 2017). Contexts include features of individuals, their interpersonal relationships, the relevant institutions, the infrastructure of the services, and features of the way the program is implemented (Greenhalgh et al., 2017; Pawson, 2006b, 2013).

The **interactions** between the elements of context, mechanism and outcome in CMO configurations are necessary for maintaining realist review's explanatory aim (Greenhalgh et al., 2017). Listing separate catalogs of contexts, mechanisms, and outcomes is not what a realist review aims to achieve; rather, it aims to look at the *interaction* of these elements to advance an

explanation of how contexts trigger underlying causal mechanisms, leading to the observed outcomes (Pawson & Manzano-Santaella, 2012).

Use of theories in realist reviews

The unit of analysis in realist reviews is '**theory**' rather than the program itself (Wong et al., 2013); instead of focusing on a specific program, realist research focuses on the theories often implicitly used within a program. These theories are often 'borrowed' by program designers and implementers for use in similar programs (Wong et al., 2013). Therefore, the theory-driven nature of realist reviews can allow the findings to be transferable to similar contexts (Astbury, 2018).

In realist research, elicited CMOs are abstracted to a theory at the middle-range level (Pawson, 2000). Merton defines **middle-range theory** as "theories that lie between the minor but necessary working hypotheses [...] and the all-inclusive systematic efforts to develop a unified theory that will explain all the observed uniformities of social behaviour, social organization and social change" (Merton, 1968) Merton suggests that explanations ought to be "sufficiently abstract to deal with different spheres of social behavior and social structure, so that they transcend sheer description" (Merton, 1967). In simple terms, middle-range theory refers to a theory which is specific enough to be tested using the available data and is general enough to work in similar circumstances (Jagosh, 2019; Pawson, 2010). Middle-range theory is not a theory type, but rather a level of abstraction (Westhorp, G, 2021, personal communication).

Realist reviews can enable transferability to similar contexts through abstracting the CMO configurations into a middle-range level (Pawson, 2000). This can be done by drawing on substantive or formal theories, which can lead the researchers to a wealth of existing knowledge (Marchal et al., 2018).

Substantive theories are derived from empirical data and relate to a particular context or empirical area (Glaser & Strauss, 1967). A substantive theory is therefore transferable only to similar contexts and empirical areas (Glaser & Strauss, 1967). For instance, a theory about physician-patient relationship can be deemed a substantive theory (Strauss, 1987).

Formal theories are more abstract than substantive theories; they can be applied to multiple areas and relate to a conceptual or 'formal' area (Glaser & Strauss, 1967). For instance, a theory relating to professional-client relationship can be deemed a formal theory; it is inherently more abstract than the physician-patient relationship substantive theory because it can be transferable to multiple disciplines rather than just the medical field (Strauss, 1987).

Substantive theories and formal theories can be considered 'middle-range' because they lie between the empirically generated hypotheses and 'grand theories' (Glaser & Strauss, 1967). **Grand theories** are all-inclusive theories and are generally derived from conceptualizations, logical assumptions, and speculations about the social world and not from concrete real-world experiences (Glaser & Strauss, 1967).

Program theory comprises the assumptions of program designers or implementers regarding how a program is expected to reach its outcomes, why, and in which situations (Marchal et al., 2018).

The **CMO configuration** introduced above is a heuristic used to analyze data and generate hypotheses in realist research (Wong et al., 2013). CMO configurations are inherently more specific than program theories and formal theories because they come from the data pertaining to our specific program of interest (Marchal et al., 2018).

Realist researchers often draft an **initial program theory** at the onset of the project (Pawson et al., 2005a; Wong, 2018). This task is referred to as 'clarifying' or 'narrowing' the focus of the study

and is a strategy to cope with overwhelming amounts of data and the complexity of realist research (Marchal et al., 2018; Wong et al., 2013). Since evaluating everything about a program in a single study is not possible, focusing the review would allow realist researchers to predetermine the set of hypotheses that they would like to investigate in their study (Marchal et al., 2018). The process of realist review is thus to collect evidence to support, refute or refine this initial program theory (Wong et al., 2013).

Initial program theories do not have to be realist (Wong, 2018). Yet, since the fruit of a realist review is a realist program theory, it seems that if the initial program theory is 'realist', this could prevent having to convert the initial program theory into realist terms during the review. An initial 'realist' program theory would then also facilitate testing of CMOs, as new CMOs can be aligned against and used to test the CMOs in the initial program theory.

Other principles of realist methodology

Further guidance about how to conduct a realist review and how to conceptualize and operationalize the constructs of context, mechanism, outcome, and their interactions are provided in manuscripts 1 and 2. I compare below realist reviews to conventional Cochrane systematic reviews, with which most dental researchers are familiar, to further illustrate the principles of realist review methodology.

- While traditional Cochrane systematic reviews focused on effectiveness normally follow a rigid and inflexible protocol, the process of a realist review is iterative, and requires moving back and forward between the steps of the review and between theory development and testing (Pawson et al., 2004; Wong et al., 2013).

- Realist reviews use data fragments or ‘nuggets’ as the unit of analysis rather than a full study (Pawson, 2006a). These data fragments can be found anywhere within a paper; that is, unlike traditional Cochrane systematic reviews that use only on the results section of a paper, data fragments for a realist review can be drawn from any part of a paper, including the introduction, methods, and discussion sections (Jagosh, 2019). What matters about these data fragments is that they would contribute to theory development and testing (Pawson, 2006a).
- Unlike traditional Cochrane systematic reviews that only draw on research studies, realist reviews draw on all data sources, including peer reviewed and grey literature, to answer the question at hand (Jagosh, 2019; Wong et al., 2013). Even a TV show or a radio broadcast can be used in a realist review (Wong, 2018).
- Unlike traditional Cochrane systematic reviews that attempt to include all relevant evidence available, searches for realist reviews are not meant to be comprehensive; that is, they do not require all relevant data sources to be included in a review (Wong et al., 2013). The searching approach in realist reviews is to balance comprehensiveness and saturation; in other words, the realist search will stop if adequate data have been identified to claim the plausibility and coherence of the final theories (Wong et al., 2013).
- Unlike traditional Cochrane systematic reviews that rely on particular types of studies (e.g., RCTs) to assure rigor (internal and external validity), in realist reviews, rigor refers to the trustworthiness and plausibility of methods used to generate data fragments (Wong, 2018). Since these data fragments can be drawn from any part of a paper and can be generated through different methods (Wong et al., 2013), assessing the rigor of the methods used to generate data fragments is an overwhelming and, in many cases, impossible task (Wong,

2018). For this reason, realist researchers have advised against making such an assessment (Wong, 2018) (Westhorp, G, 2021, personal communication).

Chapter 4 – Manuscript 1

This manuscript will be submitted to a scientific journal for publication.

The concept of 'resources' in realist research: How can it be conceptualized using the CMO configurations?

Short title: What are 'resources' in realist research?

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Abstract:

The realist approach to research, evaluation and review uses context-mechanism-outcome (CMO) configurations to understand how programs work, for whom, in which contexts, to what extent, and why. However, confusion persists as to how these CMO configurations can be conceptualized and operationalized. Specifically, researchers may wonder where resources in a program might fit within this analytic framework. This paper outlines what the term 'resources' may refer to in realist research and how this concept can be conceptualized and operationalized using the CMO configurations and realist research principles. In general, 'resources' can be conceptualized as either 'context' or 'part of program mechanism', depending on its working definition.

Keywords: methods, program evaluation, review.

Introduction

The realist approach to research, evaluation and review was developed by Pawson and Tilley (1, 2) in response to the need to account for complexity in research and evaluation of public health programs (3). The realist approach incorporates a heuristic called 'context-mechanism-outcome (CMO) configurations' to explain how the context (C) of a program influences causal mechanisms (M) which in turn lead to the program outcomes (O) (2, 4). Realist research has been gaining popularity in many domains, including social sciences, public health, and health services research (5).

Nevertheless, there remains confusion among researchers regarding how to conceptualize and operationalize the concepts of context, mechanism, and outcome in realist research (6). For instance, mechanisms have been conflated with contexts, program activities, and resources (7, 8), and contexts have been mistaken for program activities and resources (9, 10). These conflations

do not comply with the realist approach to research. Conceptualizing the program activity or the entire intervention as context shifts the attention to the program activity itself and away from what is meant by context in the realist sense; that is, the particular aspects or features that impact whether and which mechanisms fire (9, 11). Moreover, Pawson has defined program mechanisms as 'reasoning and resources' (2, 3); yet there is confusion as to what this construct means and to what the term 'resources' refers (12).

This essay aims to explain how the concept of 'resources' should be conceptualized and operationalized in realist research to facilitate eliciting elements of context, mechanism, outcome and their interactions. An example of a CMO for community-level oral health education programs for humanitarian migrants is provided to help operationalize this explanation.

The realist philosophy

The realist philosophy sits between positivism and constructivism (13). It posits that while a single reality exists, people's interpretations of it are constructed and limited by human brain and senses and brain and are thus never fully equal to reality (3, 14). Nevertheless, our limited and partial knowledge can accrue over time to reach a better understanding of reality (3, 14) because the reality itself limits the interpretations we can logically make of it (13).

Within this single reality, there is ontological depth; that is, reality is stratified in layers (14-16). Mechanisms, as the underlying causes of events, lie in deeper levels of reality, which are not always observable (14, 15). Mechanisms are often invisible because they act at different levels and different timescales than the outcomes they generate (13, 17). Furthermore, mechanisms depend on interactions or relationships between components, some of which may be observable and others not (17). While realist researchers require a degree of imaginative thinking to unravel hidden

mechanisms (16, 18), this does not mean that mechanisms are imaginary. Mechanisms are real (6, 17, 19); they exist but only operate when the conditions are right (6, 13).

Realism asserts that programs do not have a simple and linear pathway of action (20); programs are complex interventions implemented within complex, multileveled social systems (1, 20, 21). Programs and social systems are open systems; they cannot be fully isolated, reproduced or kept static (2, 22) because their boundaries are permeable to externalities such as technological and scientific shifts, movement and turnover of personnel, and intra-program and inter-program interactions (2). People, ideas, resources, and information move in and out of social systems over time (13, 22). The different levels of the social systems within which programs are implemented also affect each other and in turn impact program success (13). Furthermore, whether and how a program works depends on human agency, reasoning, and decision-making of those involved in the program (23), including program designers, implementers, service providers, and program users. Human reasoning and decision-making are also conditioned by contextual factors such as beliefs, values, and sociocultural factors (11, 13). Therefore, a particular program is never implemented and delivered the exact same way and would lead to different outcomes in different circumstances. Realist approaches to research thus seek to explain what it is about a program that works, for whom, in which contexts and circumstances, in what respects, and how (24).

What are 'resources'?

The term 'resources' can refer to different concepts in realist research, as follows:

1. What a program provides to trigger a change in the participants (2); this depends on the type of the program. It can be material resources (e.g., tools, equipment, materials), cognitive resources (e.g., knowledge, ideas, information), psychological resources (e.g.,

permission to feel, emotional support, counselling), and social resources (e.g., social networks, new relationships, referrals to other services) (Westhorp, G, 2021, personal communication);

2. Funds for operating a program; these are sometimes called 'financial resources.' (ibid);
3. The equipment, personnel, and materials provided for operating a program (ibid); and
4. Whatever enables/disables program users to put their decisions into action (11).

Where do resources fit in the CMO configuration?

Concept 1 draws on Pawson and Tilley's realist construct of mechanism (which is interaction of reasoning and resources (2)). This definition of resources (i.e., program resources) is considered as 'part of program mechanism' in realist research (25). Definitions 2-4 may or may not act as context in a particular program.

Resources as part of program mechanism

According to Pawson and Tilley, program mechanisms are 'the interaction between the resources provided in a program and people's reasoning' (2, 3). Reasoning is a general term that refers to 'anything that happens inside people's heads', which may include values, emotions, logic-in-use, or even unconscious processes (13, 26). Pawson and Tilley contend that programs provide resources, opportunities, and constraints (the three together are referred to as 'resources') which are intended to enable or change the reasoning of the target population (3, 13). In other words, it is not the program activity per se that triggers change in the target population, but rather the resources, opportunities, and constraints offered in a program, which in turn interact with people's reasoning and cause the outcomes (7, 23). For example, in oral health education programs, teaching is a program activity, which may involve presentations, discussions, and so on. The oral

health ‘knowledge’ provided in the program is the program resource, as its interaction with people’s reasoning generates the outcomes.

In realist research, context refers to the particular features or aspects that impact whether and which mechanisms fire (13). Contexts are not “observable features” or “material things”, but rather relational and dynamic “forces” which impact the firing of mechanisms (9). These features are not necessarily specific to the program itself and how it is implemented; they can also relate to individuals (e.g., personality), their interrelationships (e.g. with family and friends), institutions (e.g. healthcare systems and relevant organizations), and infrastructures (e.g. politics, economics, culture and religion) (27). Context affects how a program is implemented and how things are done in the program, which in turn impact how people respond to program resources (11). Unlike program resources, contexts are not intentionally provided in a program to trigger a change in the participants. Rather, they are particular aspects or variations within the circumstances within which a program is implemented which impact how people reason and respond to program resources (9, 11). The task of realist research is thus to elicit how the context changes the program mechanism, which is people’s reasoning in response to program resources, and leads to both intended and unintended outcomes (25). An example of an initial CMO for oral health education programs for humanitarian migrants illustrates this matter. Oral health education programs aim to provide oral health knowledge (program resource) for humanitarian migrants, aiming to trigger a change in attitude (mechanism 1) which in turn would lead to intention (mechanism 2) to improve their own oral health (outcome). Contexts impact whether the intended program mechanism operates or not: in contexts where humanitarian migrants perceive competing demands or priorities (context), oral health knowledge may be dismissed or may not result in intention to improve oral health (outcome)

because oral health will have a lower priority than other tasks for humanitarian migrants (mechanism).

Resources as context

Drawing on concepts 2-4, resources can act as contexts if they impact whether and how program mechanisms fire. If these resources do not impact the way programs work, they simply act as program settings and should be left out of the analysis (Westhorp, G, 2021, personal communication).

Lack of sufficient funds for operating a program may act as a context if it impacts how the program works. If these funds are 'adequate', they might not have a significant role in how programs work and thus can be left out of the analysis (ibid). Similarly, the equipment, personnel, and materials provided to operate a program only act as context if they influence the way people respond to that program (ibid). For instance, if the personnel's ethnicity increases the trust and message intake of humanitarian migrants with the same ethnic backgrounds, then it is acting as a context. Likewise, if the equipment, funds, and materials required for program users to put their decision into action affect how program users respond to program resources, then they act as context (ibid). For example, if humanitarian migrants' resources for practicing oral health (such as funds, toothbrush and toothpaste, or even mental resources) impact whether humanitarian migrants use the oral health knowledge to practice oral health (which they likely do), then they are acting as context.

Strengths and limitations

Disaggregating 'program mechanisms' into the interaction of 'program resources' and 'reasoning' can be helpful in distinguishing between context and the program mechanism (25). Program resources are provided in particular contexts, and these contexts impact how people respond to

these program resources (3, 25). Identifying 'program resources' also helps distinguish the program mechanism from the program activity or the intervention itself (25). While looking at program resources as a separate entity helps with the conceptualization of intervention, context, and mechanism, program resources do not constitute 'program mechanism' by themselves. Program resources and people's reasoning should always be seen as a pair because it is their interaction that forms the program mechanism (25).

The four concepts of resources can facilitate conceptualizing resources in CMO configurations. However, sometimes a particular resource may fit in more than one category. For instance, oral health educational materials provided in humanitarian migrants' own language may fit in both 'materials for operating a program' (context) and 'program resources triggering or changing humanitarian migrants' reasoning' (part of a mechanism) (Westhorp, G, 2021, personal communication). Importantly, the same thing (e.g., oral health education materials) cannot be labelled as both 'C' and 'M' in the same CMO; rather, it can act as 'context' in one CMO and as 'part of program mechanism' in another (ibid). This relates to another principle in realist research: that whether something is labeled as a context, mechanism or outcome does not depend on its intrinsic nature, but on the function it plays in explaining how a particular event occurs (17). The same element can be labeled as context, mechanism, or outcome, depending on the role it plays in explaining causal processes.

Pawson's 'resources and reasoning' construct of mechanism has limitations. First, this construct assumes that the change in a program only occurs at the individual level (17, 23). While resources are not exclusive to program participants (resources provided for other stakeholders, such as program implementers, and healthcare providers, may also interact with their reasoning to form mechanisms) and that 'resources and reasoning' may also account for 'collective reasoning' or

‘group thinking’ in a program (17), this construct of mechanism is inadequate for causal mechanisms at other levels (e.g., micro, social, and systems levels) that have important roles in how programs work but do not necessarily fit under ‘resources and reasoning’ (ibid). Second, ‘resources and reasoning’ might not necessarily be the mechanism that ‘matters the most’; other mechanisms might have critical roles in how a program works yet might be overlooked because they do not fit under the ‘resources and reasoning’ construct of mechanism (ibid).

To account for these limitations, other conceptualizations of mechanisms can apply to micro and individual levels as well as social and systems levels. These conceptualizations include powers and liabilities (e.g., authority), forces (e.g., laws), interactions (e.g., contracts and agreements) and feedback and feedforward processes (17). Discussing these constructs in detail is outside the scope of this essay. More than one conceptualization can be used to define the mechanism of interest (17). For instance, the mechanism ‘learning’ can be conceptualized as ‘resources and reasoning’ as well as ‘powers or forces.’ Deciding which conceptualization to use depends on what the researchers wish to investigate (23). Thus, researchers must determine a priori the focus of their study and their mechanism(s) of interest (4, 24).

Lastly, drawing on the realist notion that reality exists independent of our knowledge of it (14), nothing is a context, mechanism or outcome by nature; the CMO heuristic is an analytical tool and does not represent the nature of these elements, but the function they play in explaining a particular phenomenon (9, 17). Realist researchers working with realist approaches have acknowledged the limitations and complexity of using the CMO configurations. To account for these limitations, modifications have been made to the CMO heuristic. Heuristics such as ICAMO (intervention-context-actors-mechanism-outcome), CIMO (context-intervention context-mechanism-outcome), and SCMO (strategy-context-mechanism-outcome) have been developed and used in realist

research to facilitate identifying elements of context, mechanism and outcome (28, 29). The concept of 'resources' discussed in this article is also a guiding tool to facilitate identification and conceptualization of CMO configurations.

Conclusion

The term 'resources' may refer to different concepts in realist research: it can refer to the context or part of the mechanism (Westhorp, G, 2021, personal communication). The concept of 'program resources' in Pawson's 'reasoning and resources' construct of mechanism is helpful in identifying the program mechanism and distinguishing it from program activity or context. Identifying program resources can help realist researchers with understanding how contexts influence program mechanisms, leading to the outcomes. Nevertheless, not all mechanisms can be conceptualized as 'reasoning and resources': other conceptualizations might be more useful. Researchers may choose the construct which best suits their aim of study and mechanism of interest.

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Chapter 5 – Manuscript 2

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Advancing a program theory for community-level oral health promotion programs for humanitarian migrants: A realist review protocol

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Abstract

Introduction: Humanitarian migrants often suffer from poor health, including oral health. Reasons for their oral health conditions include difficult migration trajectories, poor nutrition, and limited financial resources. Oral health promotion is crucial for improving oral health-related quality of life of humanitarian migrants. While community-level oral health promotion programs for humanitarian migrants have been implemented (e.g., in host countries and refugee camps), there is scant literature evaluating their transferability or effectiveness. Given that these programs yield unique context-specific outcomes, the purpose of this study is to understand how community-level oral health promotion programs for humanitarian migrants work, in which contexts, and why.

Methods and analysis: Realist review, a theory-driven literature review methodology, incorporates a causal heuristic called context-mechanism-outcome (CMO) configurations to explain how programs work, for whom, and under which conditions. Using Pawson's five steps of realist review (clarifying scope and drafting an initial program theory; identifying relevant studies; quality appraisal and data extraction; data synthesis; and dissemination of findings.), we begin by developing an initial program theory using the references of a scoping review on the oral health of refugees and asylum seekers and through hand searching in Google Scholar. Following stakeholder validation of our initial program theory, we will locate additional evidence by searching in four databases (Ovid Medline, Ovid EMBASE, Cochrane Library, and CINAHL) to test and refine our initial program theory into a middle-range realist program theory. The resultant theory will explain how community-level oral health promotion programs for humanitarian migrants work, for whom, in which contexts, and why.

Ethics and dissemination: Since this study is a review and no primary data collection will be involved, institutional ethics approval is not required. The findings of this study will be disseminated in peer-reviewed journals, local and international conferences, and via social media.

PROSPERO registration number: CRD42021226085

Keywords: Transients and migrants, Refugees, Oral health, Program evaluation, Realist review, Health promotion

Strengths and limitations of this study:

- This study is the first using realist review to understand how community-level oral health promotion programs for humanitarian migrants work, for whom, in which contexts and why.
- The program theory resulting from this study can inform the design and implementation of successful and context-specific community-level oral health promotion programs for humanitarian migrants.
- Our research team is interdisciplinary, and we will also consult stakeholders from various relevant fields to ensure that our program theory transcends disciplines.
- Since this study is a review of existing literature, theory making is limited by the availability, richness, and quality of available evidence.
- Only studies in English and French will be included, which might lead to the exclusion of potentially relevant literature available in other languages.

Introduction

Humanitarian migrants – a term we use to include refugees, asylum seekers, and internally displaced persons – are people who forcibly move away from their place of habitual residence and are in vulnerable conditions needing urgent protection.(1) At the end of 2020, there were 82.4 million humanitarian migrants displaced worldwide due to human rights violations, conflict, and persecution, including 48 million internally displaced persons, 26.4 million refugees, and 4.1 million asylum seekers.(2) Humanitarian migrants disproportionately suffer from diseases such as tuberculosis, HIV, and mental disorders and thus have a compromised health-related quality of life.(3) In addition to poor health conditions, these populations often have compromised oral health conditions for reasons such as financial constraints, limited or no access to dental care, and the legacy of their difficult migration trajectories.(4, 5) Poor oral health further reduces the quality of life of humanitarian migrants.(6)

Good oral health enables individuals to speak, chew, breathe, taste, smile, socialize and enjoy life.(7) Poor oral health can cause pain and discomfort, social and psychological problems, and loss of effective school or work hours.(8) Oral diseases such as dental caries and periodontal diseases are associated with the risk of chronic diseases such as cardiovascular diseases and diabetes through sharing common risk factors.(9) Poor oral health can compromise quality of life by causing pain, impairment of craniofacial functions such as chewing and speaking, and reduced aesthetics, leading the individual to social exclusion and stigmatization.(10) The negative sequelae of poor oral health are of the utmost importance for humanitarian migrants who are already vulnerable to fragile health, have limited finances, and lack social support.(11, 12) Enjoying good oral health is a fundamental human right; therefore, programs and policies aiming to improve the oral health of humanitarian migrants are imperative.(13)

Many community-level oral health promotion programs have been developed and implemented to address humanitarian migrants' oral health needs. These programs intend to improve migrants' oral health via two main approaches: oral health education and dental service provision.(14) Oral health education programs aim to increase oral health knowledge of humanitarian migrants and thereby instigating a change in oral health behavior, potentially leading to improved oral health.(15-17) For example, an oral health education program in the United States provided brochures for refugee children and their caregivers to increase their knowledge of the oral health of children.(18) Another example of oral health education programs includes a program providing a multilingual oral health education DVD for refugees in Australia.(17)

Dental service provision programs intend to improve the oral health of humanitarian migrant populations through provision of dental care, such as dental restorations or extractions, by volunteer or remunerated dentists, dental students, and non-governmental organizations.(12, 19, 20) An example is the dental restoration program for Dinka and Nuer refugees living in Nebraska, aiming to restore and replace the lower anterior teeth extracted during childhood following local cultural practices.(19) Some community-level oral health promotion programs for humanitarian migrants incorporate both oral health education and dental service provision interventions for enhanced effectiveness. For instance, an oral health promotion program for Chilean refugees in Sweden provided oral health instructional sessions as well as scaling and root planning at the baseline visit.(21)

Some programs train humanitarian migrants to work as community oral health workers (COHWs) to provide oral health education and/or basic dental services for their own community.(22, 23) COHW programs aim to account for acute shortage of dental staff in settings with inadequate resources such as refugee camps, as well as to increase the cultural competency of the program

interventions.(16, 20) For instance, a program in Ghana tutored volunteers of the Liberian refugee camp ‘Gomoa Buduburam’ as COHWs to provide preventive oral healthcare and emergency dental treatment for the camp members.(22)

Notwithstanding the presumed importance of these programs, there is scant evaluation data accompanying their descriptions in the literature. Community-level oral health promotion programs for humanitarian migrants are necessarily complex interventions implemented in complex and ever-changing social situations.(24, 25) Contrary to clinical treatments, which generally have a linear pathway of action,(24) public health programs are not finite treatments or singular schemes; they include design, implementation, regulation, and management of the services.(26) Further, the success of these programs depends on client reasoning, behaviors, and decision making, and how these elements unfold within the context of the specific program, the clients’ lives, and the wider setting.(26, 27) As a result, each program will yield unique outcomes in each specific context.

Traditionally, evaluations of community programs focus on effectiveness; that is, evaluating the effect of the intervention on its outcome. Such an approach, however, often misses the important role of contextual factors: that is, how the outcomes of a specific intervention are moderated by myriad elements within which the intervention is implemented, such as interpersonal relationships, legislations, and the infrastructure of the delivered services.(28) To render community-level oral health promotion programs most effective for humanitarian migrants, understanding the underlying causal pathways through which the contexts interact with the clients involved to produce program outcomes is essential.(29)

The purpose of this study is to understand how community-level oral health promotion programs for humanitarian migrants work, for whom, in which contexts, and why.

Methods

Methodology

Realist review, also referred to as 'realist synthesis,' is a theory-driven literature review methodology developed by Pawson and colleagues(24) to inform evidence-based policy. It employs an explanatory approach to develop an understanding of how complex programs work, for whom, under what circumstances and settings, and why.(29) Using a causal heuristic called 'context-mechanism-outcome (CMO) configurations', realist reviews seek to explain how the context (particular aspects of the conditions within which a program is implemented, such as individuals, culture, interpersonal relationships, and legislations) can impact the mechanism (e.g., participants' reasoning and responses to the program resources, which will depend on their values, beliefs, and cognition) through which the outcome (intended or unintended) occurs.(27) During the review process, CMOs are constructed and refined through an iterative examination of peer-reviewed and grey literature that can shed light on how these programs work.(28) These CMOs are then incorporated and synthesized into a program theory, which explains how the programs work, in what contexts, for what populations, and why.(27, 29)

A realist review begins with an initial 'rough' program theory and ends with a refined realist program theory.(24) The realist philosophy is premised on the idea that all programs are 'theories incarnate';(30) the implementation of a program puts to test the theory about what can cause behavior change in the target population.(31) A realist review thus begins by drafting an initial program theory, which proposes hypotheses explaining how a program works.(24, 30) This initial program theory can be drawn from existing relevant substantive theories or developed by theorizing the program into a theory of action (what a program is expected to accomplish) or a

theory of change (why a program is expected to work),(28) preferably populated with realist elements of context, mechanism and outcome.(28, 32) The initial program theory is then tested and refined during the review process using the identified CMOs into a realist program theory at the middle-range level; that is, a theory that is not too abstract to detach from the context of a program and not too specific to pertain to only one program.(27, 33) The final program theory can then serve as an evidence-based tool for designing and implementing context-specific programs with optimized effectiveness.

Patient and public involvement

While patients or members of the public were not involved in the development of our protocol, we will consult and seek input from multiple stakeholders during the review process. Our stakeholders group is yet to be determined; however will include categories such as (i) internationally-renowned migrant oral health researcher, (ii) community-level oral health promotion program designer; (iii) program director; (iv) service provider (oral health educator or dental service provider); (v) service user (humanitarian migrant); and (vi) realist researcher. The involvement of the stakeholders is further explained in the methods and dissemination sections.

Objectives:

1. To develop an initial program theory explaining how community-level oral health promotion programs for humanitarian migrants work. This initial program theory will be shared with the stakeholders for feedback.

2. To conduct database and complementary searches to identify relevant data sources and elicit CMO configurations which will be used to test the initial program theory.

3. To refine the initial program theory using the CMOs into a realist program theory at the middle-range level. The refined theory will be shared with the stakeholders for feedback.

Study design

This realist review protocol uses Pawson's five stages for conducting a realist review,(24) which are: (i) clarifying the purpose of the review and the research question and drafting an initial program theory; (ii) identifying relevant studies; (iii) quality appraisal and data extraction (iv); data synthesis; and (v) dissemination of findings. These steps are iterative, with the reviewers moving back and forth between stages.

i. Clarifying the scope of the review and drafting an initial program theory

Clarifying the scope of the review

This study contributes to the CIHR-funded Migrant Oral Health Project (MOHP)'s program of research to advance an understanding of how community-level oral health promotion programs can best help humanitarian migrants. Our team is interdisciplinary with expertise in both quantitative and qualitative methods, and includes the following domains: Dentistry, oral public health, social sciences, epidemiology, and health services research. During our initial meeting, the team confirmed that by humanitarian migrants, we mean refugees, asylum seekers, and internally displaced persons. Community-level oral health promotion programs are those aiming to improve the oral health conditions of humanitarian migrants through delivering interventions at the community level (rather than the individual level). For example, an oral health education program including presentations and group discussions delivered in a community organization for newly arrived refugees can be considered a community-level oral health promotion program.

The review will commence with this broad question: How do community-level oral health promotion programs for humanitarian migrants work, for whom, in which circumstances, and why? More specific questions to be answered in this review will include:

- How do community-level oral health promotion programs for humanitarian migrants achieve their outcomes?
- Which contextual factors impact these programs' outcomes and how?
- What mechanisms are triggered by these contextual factors and how do these mechanisms lead to the observed outcomes?

Drafting an initial program theory

The next step to our realist review will be to draft an initial program theory explaining how community-level oral health promotion programs for humanitarian migrant populations achieve their outcomes. For this aim, we will use the bibliographies of a recent scoping review on the oral health of refugees and asylum seekers conducted by MOHP team members.(14) This review singles out a number of studies incorporating the common approaches of community-level oral health promotion programs for humanitarian migrants, namely: oral health education, dental service provision, and community oral health worker programs. Moreover, with the help of a librarian, the reviewers will conduct hand searching in Google and Google Scholar to identify papers with more information about the pathways through which these programs lead to their outcomes, how contexts may impact these pathways, or how humanitarian migrants may respond to program activities, including those published after our team's scoping review. A potential search strategy for these databases would be ("refugee" OR "internally displaced" OR "internal

displacement" OR "asylum seeker" OR “refugee claimant” OR “migrant” OR "humanitarian migrant") AND ("oral health" OR "dental" OR “dentistry” OR “teeth” OR “tooth”).

One reviewer will screen the articles’ bibliographies with the assistance of another reviewer to identify studies potentially having more information about the three aforementioned types of programs. The reviewers will read a minimum of 10 papers and will attempt to draft a theory of action and/or a theory of change for these programs, which will then be populated by the CMO configurations identified in the papers. Following, the reviewers will look for substantive theories that support the observed CMO patterns in the initial program theory.

The drafted initial program theory will then be shared with stakeholders for comments and feedback. We will consult with stakeholders regarding which CMOs to prioritize in our review and will ask for additional evidence. In accordance with our available time and resources for this project,(34) we will select up to a maximum of 10 CMOs for testing in our realist review process. We will incorporate the comments and feedback received from the stakeholders to further complete and finalize our initial program theory. This initial program theory will serve as a framework for data collection and analysis during the review process.

ii. Identifying relevant studies

Our searches at this stage will be conducted with the advice and recommendations of a university-based librarian, will be guided by the initial program theory, and will aim to identify data sources to test the CMOs in the initial program theory. We will conduct a systematic search of peer-reviewed and grey literature in five databases: Ovid Medline, Ovid EMBASE, CINAHL, ProQuest and PsychInfo. The developed search strategy for the Ovid Medline database is shown in Table 1. The search strategy will be converted for use in the four additional databases. We will conduct all

database searches on the same day. We will not include any date of publication restrictions in our searches. Language of studies will be restricted to English and French.

1. exp Refugees/
2. refugee.tw,kf.
3. refugees.tw,kf.
4. exp "Transients and Migrants"/
5. exp "Emigrants and Immigrants"/
6. "Emigration and Immigration"/
7. exp Undocumented Immigrants/
8. humanit* migra*.tw,kf.
9. asylum seek*.tw,kf.
10. internal* displac*.tw,kf.
11. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
12. exp Oral Health/
13. exp Dentistry/
14. oral healthcare.tw,kf.
15. exp Dental Health Services/
16. exp Fluorides, Topical/ or exp Fluorides/
17. exp Mouth Diseases/
18. exp Periodontal Diseases/
19. exp Dental Caries/
20. 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19
21. (oral* adj3 health*).tw,kf.
22. (dental* or dentist* or tooth or teeth or caries or carious or periodont*).tw,kf.
23. 20 or 21 or 22
24. 11 and 23

Table 1- Search strategy for the Ovid Medline database.

We will conduct searches in Google and Google Scholar to identify additional relevant resources for testing the initial program theory. Some search strategies used at this stage are mentioned in table 2.

Search type	Search aim	Example	Search strategy

Searches for relevant community-level oral health promotion programs for humanitarian migrants	To identify relevant CMOs for testing the initial program theory	Dental service provision programs	("refugee" OR "internally displaced" OR "internal displacement" OR "asylum seeker" OR “refugee claimant” OR “migrant” OR "humanitarian migrant") AND ("oral health" OR "dental" OR “dentistry” OR “teeth” OR “tooth”) AND (“service” OR “treatment” OR “restoration” OR “care” OR “examination” OR “prevention” OR “preventive” OR “dentist” OR “clinic”)
Searches for specific CMOs	To identify more detailed descriptions of elements of context, mechanism, outcome and their interactions in a specific CMO	Context: Experience of war	(("refugee" OR "internally displaced" OR "internal displacement" OR "asylum seeker" OR “refugee claimant” OR “migrant” OR "humanitarian migrant") AND ("oral health" OR “health” OR "dental" OR “dentistry” OR “teeth” OR “tooth”) AND (“war” OR “conflict” OR “persecution” OR “violence” OR “trauma” OR “traumatic”)
Searches for substantive theories	To identify substantive theories that support the refined CMOs, allowing them to be abstracted to the middle-range level	Self-efficacy	(“self-efficacy” OR “empowerment” OR “empower” OR “confidence”)

Table 2 – Complementary searches in Google and Google Scholar

A search of the bibliographies and citations of retrieved peer-reviewed articles will also be conducted through reference searching and citation searching(35) to identify other pertinent studies that were not included in our initial database searches.

Based on the extensiveness and depth of the identified literature in our searches, the reviewers will decide about conducting additional searches (e.g., with modified search terms and/or additional databases.) Additional searches will be conducted with the assistance of a librarian and will be aimed at identifying the specific elements of context, mechanism, outcome and their interactions mentioned in our initial program theory to provide more detailed and specific explanations of our CMOs. In case there is insufficient data regarding oral health programs for humanitarian migrants, we will draw on literature from other domains (e.g. health) or other target populations (e.g. immigrants) if we realize that they have the same mechanisms at play.(34)

Study selection and screening

The identified articles will be exported to EndNote reference manager(36) where duplicate articles will be removed. The remaining articles will then be uploaded to Covidence, an online tool for managing systematic reviews.(37) One reviewer will conduct title-and-abstract and full-text screening for the identified resources, which will be checked by a second reviewer.

The inclusion criteria for the studies in title-and-abstract and full-text screening stages will be (i) relevance to the initial program theory and its CMOs; and (ii) containing information about contexts, mechanisms, outcomes and/or their interactions. Resources containing only descriptive information about outcomes will be excluded.

Unlike Cochrane systematic reviews, realist reviews do not aim to be comprehensive; rather, the aim is to establish an equilibrium between comprehensiveness and saturation.(28) Therefore, we will stop our searches when we have obtained enough evidence to support, refute, or refine our initial program theory.

iii. Quality appraisal and data extraction

Quality appraisal

In realist reviews, the unit of analysis is not the entirety of a study but the evidentiary fragments in the study.(38) While the rigor of data is often based on the plausibility of the methods through which the data were generated,(28) in realist reviews, data can be drawn from any part of a paper, not just the results section.(27)Therefore, using standard checklists to make judgements about the rigor of the whole body of the paper may not be appropriate, as these checklists may only account for a small portion of the relevant data in the paper.(39) The most important decision to be made about data quality is the contribution each paper can make to the construction and refinement of the program theory, usually stemming from the 'pieces' of data and not the entire body of the paper.(38)

Rigor in realist reviews refers to the credibility, plausibility and trustworthiness of the methods used to generate data and depends on two criteria: trustworthiness (how much the methods used to obtain data are plausible and can be trusted) and coherence (whether the data is consistent and logical with explanatory breadth.)(32, 38) Since the information used in different parts of a paper will have been generated through specific means and methods serving specific purposes, assessing the rigor of the methods used to generate each data fragment might prove overwhelming or impossible and is not recommended by realist researchers (Westhorp, G, 2021, personal communication). Furthermore, sometimes circumstantial data identified in less rigorous data sources can contribute to constructing a convincing theory.(32, 38) Therefore, instead of evaluating and rating data quality, we will attempt to identify sufficient data to construct plausible program theories underpinned by coherent arguments.(32)

Data extraction

We will use MaxQDA,(40) a software used for qualitative data analysis for data extraction and analysis. This software will allow us to iteratively refine our codes.(41) One reviewer will read the included papers in full and extract parts of the data that can contribute to our theory development and refinement, which will be checked by a second reviewer. When confusion or concern arises (e.g., lack of adequate information), the reviewers will contact the authors of the papers to request additional information or clarification.

We will indicate each paper's characteristics in a Microsoft Excel spreadsheet. The following information will be included: (i) bibliographic details: title, author, journal and year of publication; (ii) study type and design; and (iii) target population, intervention, and type of program.

iv. Data analysis and synthesis

The data analysis process will involve identifying elements of context, mechanism, outcome, and their interrelationships in the data fragments.(25) Both quantitative and qualitative data types can be used for identifying any of these elements (Westhorp, G, 2021, personal communication). For instance, to identify mechanisms, qualitative data obtained from interviews can be a pathway to identifying participants' reasoning, while a multiple-choice question in a questionnaire survey can be used for the same purpose (ibid).(25) Outcomes can be identified through quantitative data, while in certain cases, such as identifying unintended outcomes, qualitative data might prove useful (ibid).(25) Contexts can be identified using quantitative categorical variables or qualitative data such as participant quotes in interviews or the constant comparative technique (ibid). While contexts are rarely the exact same as the categorical variables in quantitative studies or the theme titles in qualitative studies, they can provide clues for the reviewers and guide the inquiry regarding contexts (ibid).

Underlying mechanisms are often implicit in data and may not necessarily appear at the empirical level.(27) For example, the participants' reasoning occurs in their minds and might not be explicit in the data. Therefore, mechanisms need to be identified using 'retroduction,' an analytic technique to uncover hidden causal factors lying behind the identified patterns and the changes to those patterns.(42) Retroduction encompasses unearthing causal mechanisms using induction (developing theories from empirical evidence), deduction (testing theories against evidence), and abduction (creative thinking).(42, 43)

Identifying the interactions between the elements of context, mechanism and outcome is of the utmost importance in realist reviews and has been emphasized by realist researchers.(44) The accompaniment of terms relating to the elements of context, mechanism or outcome may indicate a possible interrelationship between them (Westhorp, G, 2021, personal communication). Conjunction terms such as "and", "so" and "but" can also indicate a relationship between these elements (ibid).

The identified CMOs will be used to test and refine the initial program theory. Relevant formal theories supporting these CMOs will be sought to advance our realist program theory at the middle-range level, allowing our findings to be transferable to similar contexts.(33, 45)

We will consult our stakeholder group regarding the final program theory; Their comments and feedback will be applied to further improve and finalize the final realist program theory.

Ethics and dissemination

v. Dissemination of findings

The findings of this review will be reported according to the principles of 'RAMESES publication standards for realist synthesis',(46) which outline the key elements to include in the abstract,

introduction, methods, results, and discussion section of a realist review. With the advice and input from the stakeholders, we will make recommendations regarding how to implement community-level oral health promotion programs for humanitarian migrants most effectively.

Two manuscripts will be written to report the findings of this study, one encompassing the initial program theory, and another reporting the refined realist program theory regarding how community-level oral health promotion programs for humanitarian migrants work. The manuscripts will be submitted for publication in peer-reviewed journals. The findings of this review will also be presented in oral and poster format in scientific local and international conferences. Moreover, we will disseminate the findings of this review through the MOHP website and via social media.

Ethics approval

Since this study is a review and synthesis of the literature, and that our consultations with stakeholders will not include primary data collection, institutional ethics approval is not required.

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Authors' contributions:

MEM and BN conceptualized the study. NE and NMN developed and piloted the search strategies. NE designed and drafted the realist review protocol, which was critically reviewed and revised by MEM, NMN and BN. All authors have approved the final version of the manuscript.

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Chapter 6 – Discussion

This thesis provides a protocol for conducting a realist review to understand how community-level oral health promotion programs work, for whom, in which circumstances, to what extent, and why, as well as a methodological manuscript explaining how to conceptualize and operationalize Pawson and Tilley's "reasoning and resources" construct in realist research. Further research will involve development of an initial realist program theory for these programs, testing this initial program theory, and refining it into a middle-range realist program theory. All these steps will be done with help and feedback from the stakeholders.

The result of the full realist review project will help inform community-level oral health promotion programs and interventions in a way that renders them most effective for humanitarian migrants. Our final realist program theory would help adjust interventions according to their specific contexts to ensure that the most optimal outcomes are achieved. realist reviews are interdisciplinary, taking into account not only aspects of oral health but also aspects from other domains (political, social, economical, cultural, etc.) that may impact the success of oral health promotion programs, which is in line with the Ottawa Charter Health Promotion framework. The realist approach focuses on people's reasoning and decision-making, aiming to understand why and in what conditions people make healthy choices and when, in which contexts and why they do not. Getting at the causes of these decisions allows program directors and managers to tailor the interventions to the study population in a way that would maximize their opportunities for making healthy choices.

Realism undermines the belief that strict duplication of a program and its activities would lead to program success and is the path to transferability (Pawson, 2006b). Methodologies such as RCTs or Cochrane systematic reviews have been used in program evaluation research to claim universal regularities about 'whether' a program works or not (Pawson et al., 2004). Nevertheless, this reasoning is fallible because no program can be fully replicated the exact same way for everyone in every situation (Greenhalgh et al., 2017). The realist philosophy acknowledges the context-dependency of all social programs; the theory resulting from a realist review thus will assist program designers, implementers and managers to modify programs in consonance with the contexts within which they are situated, maximizing the chances of obtaining optimal outcomes (Greenhalgh & Manzano, 2021).

The protocol provided in this thesis is not a uniform and fixed protocol to be followed rigidly; the process of a realist review is non-linear and iterative(Pawson et al., 2004, 2005a). A realist review requires a flexible research design and the researchers should be ready to face and account for challenges and uncertainties they might face during the review process (Marchal et al., 2018). Realist researchers may need to adjust the protocol accordingly as dictated by the needs of the review (Pawson, 2006b). Moreover, realist researchers may feel overwhelmed by the task of explaining complexity and making sense of it during the review (Marchal et al., 2018). Narrowing the scope of the study by drafting an initial program theory is one way to overcome the unmanageability of complexity during the review process (Marchal et al., 2018).

The realist philosophy posits that no knowledge is and would ever be equal to the absolute truth; all knowledge is partial and imperfect (Jagosh, 2019). Therefore, even after testing and refining our initial program theories, we cannot claim that our final theory will be definitively correct; they will be partial and might even be proven wrong (Astbury, 2018). The idea of cumulative

knowledge in realism contends that we can refine theories with accumulating further knowledge. New data might support, refute or be used to our findings, and as new data emerges, program theories will prove the need to be refined. Furthermore, in a 'self-transforming' reality, new aspects and challenges will constantly emerge, which will need new inquiry (Popper, 1992). The findings of a realist review should therefore be treated as "the best that we know at this point in time with what data we have" (Wong, 2018), and our theories will always be open to refinement (Astbury, 2018).

Realist research aims to account for the complexity of public health programs by focusing on program "theory" than the program itself (Wong et al., 2013). Programs will never be the same across different situations, but focusing on theories and causality will allow our findings to be reused in similar situations (Astbury, 2018; Wong et al., 2013). Abstracting our final program theory and CMOs to the middle-range level would also allow our theories to cumulate and to connect to a wealth of available knowledge, enabling the lessons learned to be transferable to similar circumstances (Merton, 1968; Pawson, 2013). These similar situations may include the dental clinic, health education programs, or even non-medical programs including social care programs for humanitarian migrants.

Chapter 7 – Conclusion

This thesis provides a protocol and methodological guidance for conducting a realist review to explain how community-level oral health promotion programs for humanitarian migrants work, for whom, in which contexts, to what extent, and why. Realist review is a relatively novel methodology that has recently entered the realm of oral public health. Yet, this review methodology is challenging and is among the most difficult review approaches. Conducting a realist review requires judgment, experience and know-how with respect to different methodologies and disciplines (Pawson et al., 2004). While the protocol in this thesis is specific to community-level oral health promotion programs for humanitarian migrants and that the same steps may not be exactly replicated for use in a different project, it can guide other researchers with applying the realist review principles to their research in oral public health. The methodological manuscript in this thesis can assist realist researchers with conceptualizing contexts, mechanisms, outcomes, and their interrelationships in their realist research projects.

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