Social Networks and Refugee Mental Health –

From Social Isolation to Family Reunification

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Lea-Maria Löbel

CONTENT

CHAPTER 1

The study of social resources in understanding refugee mental health

1. Introduction

Forcefully displaced individuals[1] make up only a minority of migrants globally, yet constitute a very vulnerable group: In 2020, 82.4 million forcefully displaced persons were officially counted by UNHCR (2021). This is 11 million more displaced people compared to 2019 (UNHCR, 2021). 73% of the forcefully displaced seek safety in neighboring countries, Turkey being the country hosting the most forcefully displaced individuals in 2020 (UNHCR, 2020). Others seek protection further away from home. From 2015 to 2020, more than two million refugees sought asylum in the European Union (Eurostat, 2020). Most of them applied for asylum in Germany (UNHCR, 2020).

Refugees all share the characteristics of involuntary decision making and helplessness, given their tremendous loss of resources throughout migration. Refugees are likely not only to have experienced war, persecution, incarceration (Silove, Sinnerbrink, Field, Manicavasagar, & Steel, 1997; Steel et al., 2009), and difficulties living a normal life free of financial hardship. En route to what they hope is safety, they are also at mercy of systems that can both aid and hinder their movement. In the 2016 IAB-BAMF-SOEP Survey of Refugees in Germany (Goebel et al., 2019), 17% of respondents said they were exploited or had experienced fraud as a result of dealing with human traffickers (Brücker et al., 2016). But stress and loss of financial and non-financial resources does not stop at the border to a secure host country. Waiting for a residence permit, living in detention-like housing, and having an overall uncertain future are equally stressful experiences in host communities (Beiser & Edwards, 1994; Khawaja, White, Schweitzer, & Greenslade, 2008.; Li, Liddell, & Nickerson, 2016; D. Ryan, Dooley, & Benson, 2008; Steel et al., 2009; Walther, Fuchs, Schupp, & von Scheve, 2020).

Inequal distribution of resources is a widely studied subject in sociology and not limited to refugees. In many incidences, studies show an unequal distribution of resources between a country's host population

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[1]Throughout this dissertation, I will also refer to refugees or forced migrants and include in this definition individuals seeking, having planned to apply, or having applied for asylum, as well as those who have received a form of decision on their asylum application. This definition also includes the possibility that their asylum claims have been denied but they are yet to leave their current country of residence. In Germany, two forms of asylum can be granted: First, by means of Article 16 of German Basic Law (*Grundgesetz*), which applies if individual political persecution is at risk; Second, through application of the 1951 Refugee Convention and Article 3 of the German Asylum Act (*Asylgesetz*).

and migrants in general. Although migrants have a higher labor market participation rate than natives in almost all countries worldwide (ILO, 2021), their income remains far below that of the host population (ILO, 2020). Similar inequalities can be found in health resources (Giannoni, Franzini, & Masiero, 2016; Klein & Von Dem Knesebeck, 2018; Viruell-Fuentes, Miranda, & Abdulrahim, 2012). Yet the inequality in resources is hypothesized to be even stronger for refugees, compared to other migrants or natives, based on their involuntary migration. Given these extreme resource losses, psychiatry has highlighted elevated prevalence rates for mental illnesses among refugees (see Fazel, Wheeler, & Danesh, 2005). However, this research tradition does not focus on the general mental health of entire refugee populations (Keyes, 2002; Keyes & Shapiro, 2005). The formulated models, furthermore, do not account for the protective resources and structural constraints of the social environment refugees are placed in.

This dissertation fills this important research gap. It combines models developed in the health sciences with theories from sociology on how social networks influence mental health, applying this approach to the context of refugees living in Germany. Overall, this dissertation takes a multidisciplinary perspective on refugees' mental health. First, this dissertation advances the resource model on refugee mental health, as proposed by Dermot Ryan, Dooley, and Benson (2008), combining it with sociological considerations on the importance of looking at general mental health as an outcome (Keyes, 2002). Second, it tests assumptions on how the structures of close knit social networks (Burt, 2000; Coleman, 1988; Hall & Wellman, 1985; Thoits, 2011; Wellman & Frank, 2000) and family networks specifically affect mental health in the case of refugees, also in comparison to the hosting population and other immigrants.

This cumulative dissertation asks: *How do (kinship) social networks influence refugee mental health in the aftermath of resettlement?* The first empirical chapter[2] studies how forced migration alters the strength of association between social isolation and loneliness in comparison to other migrants and a host population (Chapter 2). Testing differential susceptibility to social isolation with respect to

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[2] Löbel, L. M., Kröger, H., Tibubos, A. N. (2021). How migration status shapes susceptibility to social isolation – A comparison of the relation between social isolation and loneliness in refugees, migrants, and the host population in Germany. *Submitted to the Journal of Epidemiology and Community Health.*

loneliness contributes to the discussion on the particular vulnerability of refugees, beyond differences in resource levels (Cacioppo & Patrick, 2008). The second empirical chapter[3] applies the resource model of refugee mental health combined with theory from sociology to the case of refugees. Analyses illustrate how the size and spatial distribution of family networks correlate with refugee mental health (Chapter 3). The third empirical chapter[4] discusses resource gains among refugees, family reunification, and the associations with mental health (Chapter 4).

The opportunities to advance knowledge in this field are manifold: Primarily, the focus on the social environment as a resource and structural constraint is valuable as the starting point for the development of feasible interventions for refugees (De Silva, Mckenzie, Harpham, & Huttly, 2005; Kawachi & Berkman, 2001). Research has focused on the mentally ill and advancing drug treatment. Yet many refugees do not suffer post-traumatic stress disorder (PTSD) or depression and still struggle with mental health on a broader spectrum. There are trials with broader services to refugees, including family counselling, one-stop shops with mental health- and other administrative services, group support, and mentoring (Böge et al., 2020; de Graaff et al., 2020; Legewie et al., 2019; Robertshaw, Dhesi, & Jones, 2017). Moreover, mental health is seen as a means to other integration outcomes (Bakker, Dagevos, & Engbersen, 2014; Strang & Ager, 2010).

In the following introductory chapter of this dissertation, I will give an outline of the current theoretical discourse in the health sciences and sociology, considering the applicability to the study of refugees (Chapter 1). I highlight the latest advances in the form of the resource model of refugee mental illnesses and establish links to the sociological discussion of the availability of resources among groups. I anchor this resource discussion in the field of sociology and social resources, describing the different avenues of studying the social environment as a determinant of health. Social capital, social networks, and social support are introduced as concepts with their own theoretical foundations and measurements – a specification of the resource concept used so far. By comparing the approaches to one another and

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[3] Löbel, L. M. (2020). Family separation and refugee mental health–A network perspective. *Social Networks*, 61, 20–33. https://doi.org/10.1016/j.socnet.2019.08.004

[4] Löbel, L. M., & Jacobsen, J. (2021). Waiting for kin: a longitudinal study of family reunification and refugee mental health in Germany. *Journal of Ethnic and Migration Studies*, 47(13), 2916-2937. https://doi.org/10.1080/1369183X.2021.1884538

drawing linkages, I conclude that there is little understanding of refugees' social resources, specifically in terms of their structure, and how they relate to their overall mental health.

2. From a medical model to a resource model of refugee mental health

The study of refugee mental health began in psychiatry, with a focus on mental illnesses. Given the need to expand from the knowledge on the incidence of mental disorders[5] (the Medical Model), psychiatry and psychology since then have advanced models that research coping strategies (the Psychosocial Model) and external factors creating stress. The latest theoretical discussions take the view that the different resources of forcefully displaced persons should be studied in understanding their vulnerability to mental illness (the Resource Model). In the following, I will give an overview of the different stylized models that have come about, how they build upon one another, and the criticisms they face. From that, I draw conclusions on how the models should be further developed. First, I argue for the study of mental health compared to mental ill-health as an outcome. Mental ill-health, as is applied in the following three models presented, is a defined health problem that changes "emotions, thinking and behavior", related with the inability to function in everyday life (American Psychiatric Association, 2021a). Mental health, meanwhile, is a description of the general state of mental well-being, oscillating on a continuum (Keyes, 1998). Second, this introduction focuses in more detail on the social sphere. As a positive association is generally postulated, studying the social resources of refugees is an important area of research; this is a resource potentially lost during forced resettlement, but one that can be regained in the aftermath of forced migration.

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[5] Symptoms are the subjective reactions identified by the patients themselves. If they comprise a specific set of symptoms, diseases or illnesses can be identified on the basis of psychological processes. Disorders are also psychological irregularities, but the make-up of their symptoms is less distinct. Depression is a dirsorder with symptoms such as sadness, loss of interest, sleeping difficulties, and loss of energy. Anxiety is another term for feeling fear.

2.1 The medical model: a focus on mental illness

How many refugees suffer from mental illness after strain[6] sustained during resettlement? Psychiatric and health scientists repeatedly make valuable contributions to answering this question, by estimating the demand for clinical interventions in forcefully displaced persons. They estimate the incidences of PTSD, depression, and anxiety (Nickerson, Bryant, Steel, Silove, & Brooks, 2010; Silove et al., 1997; Steel et al., 2009, 2006; Steel, Silove, Phan, & Auman, 2002). The aim of this research is to understand the prevalence of mental illness in different migrant groups. Observing symptoms, categorizing them into classes of illnesses, and identifying cures for mental health problems is often referred to as applying the "medical model" – an outcome-oriented approach (Graph 1). Looking for the biological explanations for abnormal behaviour has helped to reduce the stigma of sufferers and has led to the design of interventions that treat the abnormalities using both pharmacological and non-pharmacological treatment (Shah & Mountain, 2007).

Graph 1: The medical model

Particularly PTSD, a mental disorder that forces individuals to relive traumatic experiences or generates feelings of sadness and anger (American Psychiatric Association, 2021b), is the subject of research in relation to trauma sustained during war and displacement. Studies on the Vietnamese population, as well as Vietnam war veterans in the US, are prominent examples of the medical model being applied (Summerfield, 1999). Data reveals most of the populations to be suffering from depression and PTSD. Prevalence rates up to 85% within a sample have been established (Carlson & Rosser-Hogan, 1991). Such findings suggest that war almost inevitably leads to mental illness among the populations who flee

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[6] Stressor is another name for a burden or an overload – an exhausting event (Wheaton, 1994; Wheaton & Montazer, 2012). It is an external force, one that becomes unbearable. It can either occur once or on a continuum (Pearlin, 1989; Pearlin, Lieberman, Menaghan, & Mullan, 1981); the latter is referred to as long term strain. Stress is then the bodily reaction to the event having occurred.

it. Three important meta-studies have been conducted since then, summarizing prevalence rates of mental illness for different groups of refugees.

Fazel et al. (2005) conducted a meta-analysis on refugee mental illness and looked at the results of 20 studies on refugee-related trauma, collecting the data of studies, all comprising 6743 refugees. The authors postulate a more moderate incidence of refugee mental illness, compared to earlier studies. However, they also find that refugees who resettled in western countries are about ten times more likely to suffer from PTSD than the general population. The summarized prevalence of PTSD was 9% among the refugee populations, and 5% showed symptoms of depression (Fazel et al., 2005). Ultimately, however, depression rates in western societies are equally high as in the refugee population (Fazel et al., 2005). The study is well-received in the research community, as it raises much-needed awareness of the issue, but is also circumspect about its prevalence (Wain, Miller, Elbert, & Rockstroh, 2005).

Two further studies apply the medical model. In the first study, prevalence rates for symptoms of depression and anxiety, as well as disorders such as PTSD, are summarized and analysed, yielding the result that prevalence rates for depression within the refugee population (44%) are almost twice as high as in the group of labour migrants (20%) (Lindert, Von Ehrenstein, Priebe Kucukalic, & Mielck, 2009). Further, accounting for the Gross National Product (GNP) and hence the economic performance of the host countries, a higher GNP correlated with lower prevalence rates for these issues among migrants. However, this finding does not hold for refugees (Lindert et al., 2009). In the second study, risk factors and methodological factors are examined in a meta-analysis by Steel et al. (2009), explaining the difference in prevalence rate for PTSD and depression in refugee communities. The regression considers potentially traumatic events such as torture, the time passed since the conflict, and the country of origin as proxy for experiences in the home country. All indicators are associated with PTSD and depression. Cumulative exposure to traumatic events results in even higher rates of PTSD. The findings are an indicator that it is not only a once-in-a lifetime event which shapes the mental health status of refugees – it is also the endurance of long-term conflict and traumatic events that explains the prevalence of PTSD (Steel et al., 2009). Overall, the study suggests prevalence rates between 13% and 28% (Steel et al., 2009).

The two studies are an indicator of a shift in how to study mental illness in the population of refugees. Research considers contextual determinants and the stressors incurred. Therefore, it tackles a prominently criticized shortcoming of the medical model of refugee mental illness: its apparent disregard for the different experiences of refugees.

There is also a second criticism of the application of the medical model; that it promotes diseases mongering, or overdiagnosis, for the refugee subgroup as for the general population. Simultaneously, sufficient interventions are clearly lacking and are not created simply because of these study results. The initial aim of studies choosing a medical model are noble: detecting the mentally abnormal. Nonetheless, detecting mental illnesses such as PTSD does not necessarily offer relief, but often a victim status (Summerfield, 1999). PTSD helped to secure victim status for war veterans from Vietnam and served as a defence for committing war crimes in Bosnia and South Africa. The concept finds application in relation to complicated child births, road accidents, or cases of harassment (Summerfield, 1999). However, applying the concept in inflationary manner does not make its user case stronger. Moreover, diagnosing mental illnesses imply technical solutions, although interventions are mostly only available in western countries. Even in the European context, psychological counselling is expensive and difficult to access for locals and immigrants alike.

A third limitation comes with cultural differences: Not only does the medical model require that a phenomenon like PTSD occurs in different cultural and social settings. It also necessitates that this concept means the same in all settings (Summerfield, 1999). Refugees who experience war, prosecution, and resettlement often do not pay attention to their mental state but rather to their social surroundings and how they have changed. When treatment shifts away from what the "victims" deem necessary in their own lives towards focusing on a mental illness, ownership of the experience is taken away from the refugees (Summerfield, 1999). It is questionable whether refugees treated for mental illnesses regard their suffering as abnormal compared to other affected populations (Pupavac, 2004). Applying psychiatric knowledge in the field of humanitarian intervention seems laudable, as it fulfils a responsibility to protect the vulnerable (Bracken, Giller, & Summerfield, 1997). Yet, Bracken and others comes to the conclusion that there is, in fact, an alternative to the medical model being applied

in humanitarian crises: moving away from labelling distress as a medical condition by default, and instead listening and understanding the stress response, working to reduce it instead of offering western oriented treatment (Bracken et al., 1997).

2.2 The psychosocial model: individual determinants of refugee mental health

One model which recognizes both the normal and abnormal health status of refugees is the psychosocial model. This model was first proposed by Richard Lazarus and Susan Folkman, summarizing their years of research in the field of stress and mental illness (Lazarus & Folkman, 1984). The psychosocial model (Graph 2) asks the question as to why some people who experience traumatic events will develop mental abnormalities while others are not affected by these stressors. This empirical phenomenon can already be noted in the meta-analyses mentioned above: incidences of mental illnesses vary by population.

Graph 2: The psychosocial model

| Stress | → | Coping | → | Refugee Mental Illness |
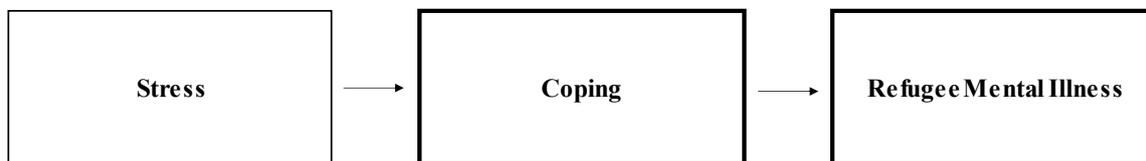
The psychosocial model acknowledges the existence of individual methods for dealing with environmental factors, an act that is called appraisal. The concept of appraisal refers to the internal solving of problems (Lazarus & Folkman, 1984). The assumption is that the meaning we give to an event we experience shapes our emotions and ultimately our mental health (Lazarus & Folkman, 1984). As events unfold, a re-evaluation of situations or entire life phases takes place, in which individuals make sense of the world and take decisions on how to act accordingly. Another stress response besides appraisal is coping: the activities carried out to deal with the stressful situation, such as taking action to solve the problem or avoiding situations. That said, coping goes beyond pure internal appraisal.

The psychosocial model includes numerous concepts which describe different devices for and influences on individuals' coping ability. A first concept in this literature is commitment, describing

individual preferences (Lazarus & Folkman, 1984). If a person prefers a stable job over a social network, for instance, he or she will feel more stressed by the loss of or threat to that job than by the thought of moving from one city to another to take up employment. Second, beliefs are part of the way individuals make sense of the world: pre-defined and culturally dependent ideas about how reality evolves. Third, reappraisal, the alteration of beliefs and preferences, is a coping device and influenced by situational factors such as novel events or information, the predictability of the environment, and timing (Lazarus & Folkman, 1984). Last, resilience is an even broader concept, one often mentioned in this line of research. Resilience is defined as a positive adaptation in the context of past and present adversities (Wright & Masten, 2005). Resilience is a positive response to the risk of imminent diminished functioning (Pickren, 2014).

Applying the concept of coping in the refugee context allows us to focus on what determines refugee mental illness. It shifts the perspective towards the question as to what mitigates stress in times of crisis. In the case of the psychosocial model, coping devices describe responses to extreme and stressful events: practicing self-control, humour, crying, and 'thinking it through' are only some of many normal responses to stressors which offer relief for those who experience them (Lazarus & Folkman, 1984). Nevertheless, it is almost goes without saying that not every individual possesses the same resources to do so. Constraints on the individual and environmental level can restrict the ability to cope.

One method of combining accounts of stress reported by refugees with their assessments of making sense of the experiences is to conduct qualitative interviews. The approach represents an exploration of events that occur before, during, and after resettlement, combined with an evaluation of how someone feels after living through these experiences. Alemi et al. apply this approach, looking into the lives of Afghans interviewed in the San Diego area. Semi-structural interviews divided into four topics discuss the causes and risk factors (stress) of forced migration, depressive symptoms experienced, and treatments for depression (Alemi, James, & Montgomery, 2016). Besides the study of determinants such as family and community support, the analysis indicates that the use of medicine was still the most endorsed treatment of depression, followed by keeping oneself busy and pursuing leisure activities (Alemi et al., 2016).

Hutchinson and Dorsett conduct a meta-analysis of qualitative interviews, looking for evidence of what constituted help in the event of adversity in the refugee community (Hutchinson & Dorsett, 2012). By compiling different accounts of war- and refuge-related stress, they also categorize factors which help to build resilience in the refugee community. In summary, they observe internal resources such as optimism, adaptability, perseverance, belief in inner strength, and positive attitudes from support (family, friends and the community), as well as religion and spirituality (Hutchinson & Dorsett, 2012). Their conclusion follows that of previous researchers: therapeutic help was frequently presented in the form of medicine, with less focus on existing coping mechanisms (Hutchinson & Dorsett, 2012).

In conclusion, the psychosocial model is concerned with the inner life of individuals and how they make sense of a situation. However, it does not lead to a different approach towards treatment of mental health in refugees compared to the medical model. The model which Lazarus and Folkman propose mostly suggests cognitive-based forms of therapy (Ryan et al., 2008). While the medical model has been criticized for this approach to treatment, and for disease mongering in general, the psychosocial model does not offer alternative treatments either.

2.3 The resource model of refugee mental health

Graph 3: The resource model
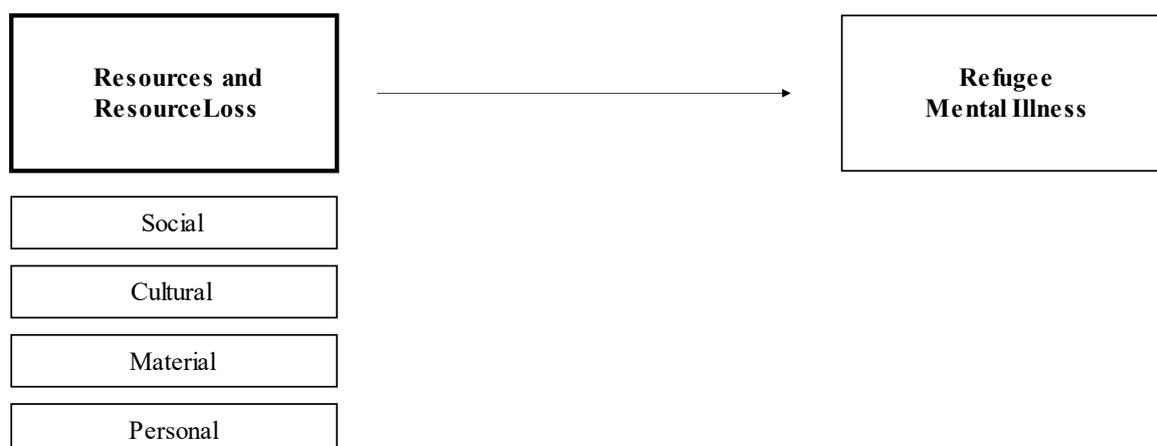
The psychosocial model has inspired other researchers to build on it. One of these models is the resource model of refugee mental health (Graph 3). Ryan, Dooley and Benson (2008) note in their theoretical work that individuals never encounter a stressful situation within a "social vacuum". They are only able to judge and appraise a situation with the tools given to them at the time of threat or strain. Not looking at these constraints would lead to omitted variables that confound with the ability to cope.

Ryan et al. (2008) consider not only the coping strategies of refugees but, primarily, their potential resources for coping. First, they acknowledge the importance of coping and personal resources as studied in the psychosocial model by Lazarus and Folkman. They also emphasize that stress is not perceived equally given different resources of individuals. Second, the authors highlight the contributions of Berry`s "acculturation framework" (Berry, 1997). Berry observes: "changes in the cultural context exceed the individual's capacity to cope, because of the magnitude, speed, or some other aspect of the change, leading to serious psychological disturbances, such as clinical depression, and incapacitating anxiety" (Berry, 1997, p.13). Yet, Ryan and colleagues criticise this terminology in the specific context of forced migrants: "Such a term disguises the fact that many of the demands (e.g. unemployment, family separation) they are exposed to concern the thwarting of psychological needs that are common to all humans irrespective of their ethnocultural background." (Ryan et al., 2008, p.5). Applying Hobfoll's conservation of resource theory (Hobfoll, 2001), the authors provide many of the prerequisites for a qualitative assessment of the needs in refugees, and of how constraints in resources limit these needs and create stress.

In their initial theoretical observations, the authors focus on the resources of refugees, categorizing them as material, social, cultural, and personal (Ryan et al., 2008).[7] They consider various resources and their losses throughout forced migration (Graph 3). Resource losses are equivalent to what has been previously labelled stress or trauma, for instance loss of bodily integrity and health, as a result of individuals experiencing torture, or the loss of employment and financial stability. Ryan et al. (2008) warn that refugees enter a resource loss spiral, in which diminished access to and underutilization of

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[7] Personal resources are health, strength, mobility, and ability; material resources are personal belongings, money, wealth, a house; social resources are personal relationships; cultural resources are skills, knowledge, and actions derived from norms.

resources perpetuate themselves. This implies the simultaneous study of events and long-term strains before, during, and after migration. While the authors propose this model for qualitative research, in practice, this categorization can be utilized in quantitative research as well.

Studying resources to achieve certain outcomes is not restricted to psychology, psychiatry, or the health literature as such. Understanding the distribution of resources in society, and the consequent inequalities, is an inherently sociological exercise. Research of well-being, in particular, has long looked at individual constraints to achieving higher order goals. A rational choice perspective on the subject is, for instance, provided by Lindenberg and colleagues in form of the Social Production Function theory, in which individuals strive for maximum well-being (Ormel, Lindenberg, Steverink, & Verbrugge, 1999). In the authors' elaborations, physical and social well-being represent two universal goals, which in turn are made up of instrumental goals to be achieved. In this theory, resources contribute to the achievement of instrumental and ultimate goals, dependent on resource makeup of the individual. Where resources are not available, it must then be established if there are suitable substitutes to achieve the same goals (Ormel et al., 1999). The absence of resources presents a cost for production, and can necessitate the substitution of resources, goals, and ultimate aims. Yet the authors also stress that certain goals might not be achieved through substitution (Ormel et al., 1999). With regards to the case of refugees, this could be – for instance – the love and support provided by kinship ties, which is similar to but not exactly like the affection and resources offered by friends, acquaintances, or institutions (Thoits, 2011). Overall, it is well understood that the need to socially belong is strong and that individuals to a large extend will try to substitute social resources for greater well-being (Baumeister & Leary, 1995).

Life changes are said to influence the means of production fundamentally (Ormel et al., 1999). This is equally highlighted by Ryan et al. (2008), who study the determinants of well-being in the group of refugees more closely. Particularly those resources which block buffer formation for well-being, and at the same time make substitution impossible, hinder overall coping (Niboer & Lindenberg, 2002). While Ryan et al. propose qualitative approaches to examining resource loss and gain as well as the level of substitution possible, Lindenberg and colleagues use quantitative methods to disentangle resources and

their substitutability. The qualitative accounts enable a more precise discussion of how people weight their resources, while in quantitative terms, this must be assumed, unless one asks directly.

Researchers studying refugee mental illness have started to account for stressors of the pre-migration settings, the re-settlement process itself, and the situation in the host community – signalling resource loss. In a first set of studies, pre-migration stressors are taken into account, such as the number of traumas sustained (Silove et al., 1997), but also migration detention (Steel et al., 2002) and torture (Steel et al., 2006). Other studies move on to also consider post-migration living difficulties for refugees when evaluating their risk of suffering from mental illness. For example, Schweitzer et al. study stress levels of Sudanese refugees living in Australia. Considering pre- and post-resettlement factors, they conclude that the circumstances of resettlement accounted for psychological distress in 25% of the cases (Schweitzer, Melville, Steel, & Lacherez, 2006). Other studies focus particularly on unemployment and weak social ties (Teodorescu, Heir, Hauff, Wentzel-Larsen, & Lien, 2012), length of asylum procedures (Laban, Gernaat, Komproe, Schreuders, & De Jong, 2004), living arrangements, and fear from family being still endangered abroad (Nickerson et al., 2010). A first synthesis of results is provided by Porter and Haslam (2005), who provide a meta-analysis of both refugee-specific and socioeconomic determinants of refugee mental ill-health.

The series of articles applying a resource-based model acknowledge that psychiatric interventions only have one role to play, alongside services that equip refugees with new resources or guide them to use existing ones (Craig, Jajua, & Warfa, 2009). They recommend more interdisciplinary research and an ecological model of mental health (Miller & Rasmussen, 2017). An overemphasis on war exposure and severe trauma does not help in understanding how to support refugees once resettled (Miller & Rasmussen, 2009). Overall, refugees express a desire to move forward with their lives and to make the best of the given circumstances (Savic, Chur-Hansen, Mahmood, & Moore, 2016). Hence, there is a need to further elaborate on the resources refugees have, and which social and other resource constraints exist that can be addressed in the host communities.

### 3. From mental ill-health to mental health – shifting perspectives on how we describe the state of mind

Contemporary research is yet to go beyond the boundaries of studying traumatic events and their associations with serious mental illnesses and disorders in refugee populations. The reasons for this are clear. The acuteness of mental illness and what this means for social functioning is reflected in health costs: hospitalization, inability to work, and other indirect costs (Jha, Figueroa, Phelan, Orav, & Patel, 2020). Psychiatry and psychology are hence inherently concerned with mental diseases themselves. Yet, this focus might create stigma and limit the ability to see beyond the most severe mental abnormalities. The application of the concept of mental illness assumes that there are only two mental states: a healthy and an abnormal state of mind. Falling into this trap of disease mongering is evidence of the limitations of the medical model. Applying a sociological point of view on the topic, the concept of positive mental health serves as an alternative, providing a way out of this narrative. In this section I will introduce the notion of mental health as a broader concept of mental well-being (Keyes, 2002; Keyes & Shapiro, 2005), and explore the application of this approach and links to research on refugees.

Mental health is prominently defined by the World Health Organization (2014) as the "[…] a state of well-being in which every individual realizes his or her own potential, can cope with the normal stress of life, can work productively and fruitfully, and is able to make a contribution to her or his community." Keyes (2002) defines mental health as "a syndrome of symptoms of positive feelings and positive functioning in life", operationalized by measures of subjective well-being. The concept is a continuum from flourishing or positive mental health and a state of absence of mental health, referred to as languishing (Keyes, 2002). In a confirmatory factor analysis of mental health and mental illness, Keyes shows how the structure of mental health is distinct from mental illness (Keyes, 2005), also as pathway to functioning in everyday life (Keyes, 2012). Yet the concepts are related: The author shows how languishing is associated with episodes of severe mental disturbance that could be considered depression (Keyes, 2002). Needless to say, functional impairments are highest when mental languishing and depression occurred jointly (Keyes, 2002).

By employing the concept of mental health, one moves away from a medical point of view to a concept ultimately linked to levels of functioning in society, where individuals can be placed on a continuum – an inherently sociological view. Seeing mental health as an enabling factor (Ager & Strang, 2008), the study of refugee mental health focuses on whether a refugee is mentally healthy enough to take part in the daily social, cultural, and economic life of the host community.

The key argument in this dissertation: The medical and psychosocial models are important avenues of research in relation to refugee mental illness. They identify abnormalities in the human condition after stressful life events. Additionally, the resource model makes a particular claim for studying the peculiarities of forced migration and resource loss and gain throughout this time in understanding mental illnesses. However, applying a resource-oriented model, it is appropriate to move from the concept of mental illness to the measure of mental health on a continuum. Not only does this allow us to frame the discussion in terms of resource loss and gain, potentially observing positive changes in mental health. Moving the model, as by Ryan et al. propose (2008), in a sociological direction, diminishes the exclusionist tendencies of the outcome-oriented approach, which stigmatizes those who are mentally ill and excludes from further debate those who seem healthy (Graph 4).

Graph 4: The resource model, with mental health as outcome
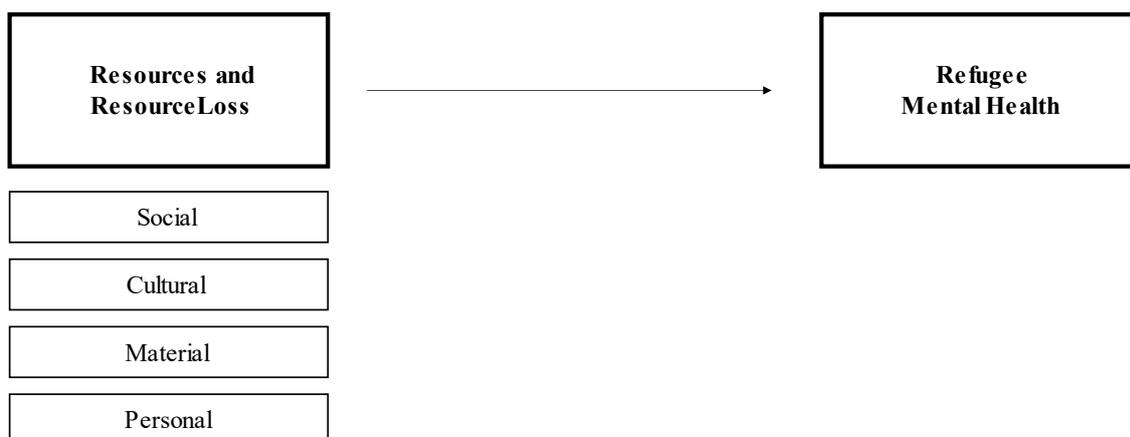
To date, only a handful of researchers have employed (positive) mental health in the refugee context. For instance, Beiser and Hou (2017) implement Canada's 2013 General Social Survey to measure the self-reported positive mental health of refugees and immigrants, including immigration-related predictors. In their study, they show how living in closed ethnic communities does little for overall mental health, maybe due to the long time the surveyed individuals already lived in Canada. Moreover, Walther and colleagues study life satisfaction as subjective cognitive well-being outcome, showing how the aim of reuniting with family significantly decreases life satisfaction (Walther et al., 2020).

4. The resource approach from a sociological perspective: an introduction to the social resources of social capital, social networks, and social support

Besides shifting towards the study of a positive mental health outcome, this dissertation focuses on the questions as to which social resources refugees are equipped with. Applying concepts from the sociology of mental health to the refugee context and observing (kinship) networks, the dissertation makes the claim that refugees are agents to their well-being by means of their social environment, which brings strength but sets limitations. Therefore, this dissertation offers an interdisciplinary investigation into refugee mental health, focusing on access to support via social networks.

This section introduces the sociological framework applied to studying refugees' social resources and their association with mental health (Graph 5). First, the sociological foundations providing the basis for studying mental health will be recalled. Second, by distinguishing different concepts that describe social resources, the dissertation provides an overview of different avenues to study social determinants of mental health in general, and refugee mental health specifically: social capital, social networks, and social support – a spectrum of social resources. Finally, I propose the selection of a network approach, studying refugee mental health as a starting point to understand the complex interplay of network structure, function, and capital for mental health. Descriptively, it is interesting to understand levels of resource deprivation compared to other migrants and hosting populations. Moreover, we have no knowledge about the susceptibility of refugees to a lack of social resources with regards to their mental health, compared to other migrants and refugees. While there is ample evidence that social resources have a positive effect on mental health in general, there is also little knowledge on how social resources among refugees are structured and to what extent they are associated with their mental health. One specific attribute receives special attention: spatial separation from members of the social network. Though this attribute can be studied in other migrant populations and even hosting communities in light of their social support provision (Spring, Ackert, Crowder, & South, 2017; Viry, 2012), it is far from clear how refugee networks are spatially distributed, given the involuntariness of forced migration, and how this circumstance alters their mental health.

Graph 5: The resource model, with a focus on social resources
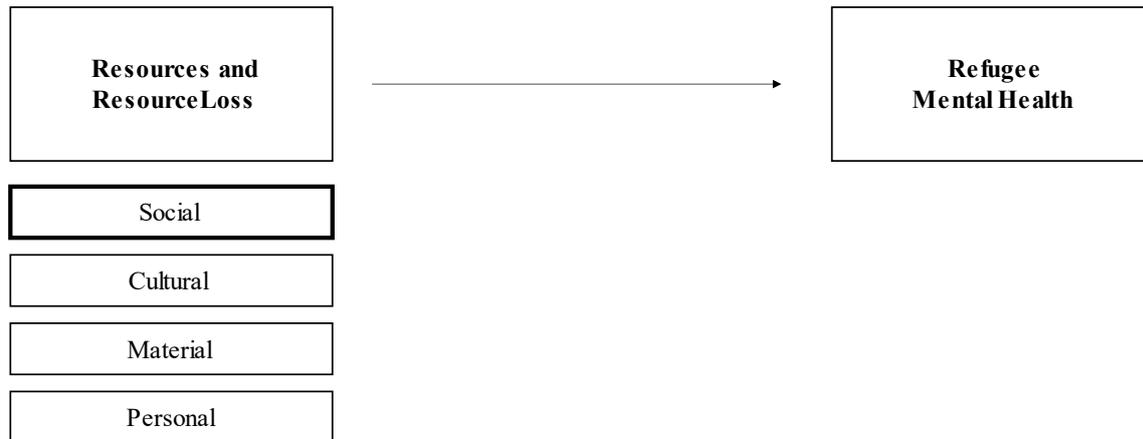
Taking a sociological approach studying social resource loss and gain (Graph 5) to understand mental health is nothing out of the ordinary: the construction of a sociology-health research nexus dates to Durkheim, who studied variation in suicide rates. He examines the likelihood of suicide, a long-studied outcome of mental health, based on forces outside of the sphere of the individual, and social in nature (Durkheim, 1951). One environmental factor he names is the objective social isolation of individuals: the lack of supportive social structure. Durkheim proposes that isolation from others, the lack of social resources, results in loss of orientation in life, which can ultimately lead to suicide. Psychology has an evolutionary explanation for such a reaction. In the absence of social contacts, some experience inner unrest, a warning sign of the body to return to the secure environment of a group, which can protect individuals from natural hazards (Cacioppo & Patrick, 2008; Victor, Scambler, Bond, & Bowling, 2000). Making mental health languishing a collective rather than an individual issue is also proposed by Mills (1959), in his seminal work "The Sociological Imagination". The author emphasises that limited individual possibilities in life are in fact not an individual but a societal concern and determined by social structures. Absence of primary contacts is proposed as a determinant of mental health languishing by Weiss (1974) as well. These authors argue that we should study the social environment of individuals from a structural perspective and not only in terms of individual traits such as internal coping devices.

Mental health as a sociological phenomenon has been investigated by many social scientists. Population-based mental health studies from the 1980s onwards provide insights into the prevalence of mental health in entire sub-populations (Pescosolido, McLeod, & Avison, 2007). Furthermore, environmental stressors as the focus of mental health studies are famously summarized by Thoits (2009, p.106): "the sociological approach [to mental health] focuses on the factors external to the individual – the environmental or social context – and views mental illness as a breakdown in the face of overwhelming environmental stress." Three research traditions stand out in describing the social realities of individuals and how they are related to their mental health: the study of (1) social capital, (2) social networks, and (3) social support. The following passages introduce these resource concepts and their links to health.

4.1 Social capital

One avenue to studying social connections in relation to mental health is the use of the notion of social capital. Pierre Bourdieu famously differentiates resources into several forms of capital. Besides economic capital – characterised by individual property, savings, income, and other assets (Bourdieu, 1985a)[8] – he proposes cultural capital, in the form of culturally-specific information, belief systems, and norms, as well as education (Bourdieu, 1985a). Finally, pioneering a new way to think about social structures, Bourdieu introduced social capital, "the aggregate of the actual or potential resources which are linked to the possession of a durable network of more or less institutionalized relationships of mutual acquaintances and recognition" (Bourdieu, 1985a, p.251). Social capital is both a description of the social environment of an individual and the knowledge and other resources inherent in this environment. Based on the different forms of capital, Bourdieu continues to place individuals in a "field of forces", depending on the personal configuration of the forms of capital (Bourdieu, 1985b). His theory states that individuals can exchange forms of capital for others (Bourdieu, 1985a). The lack of a resource, however, limits one's ability to convert one form into another. As such, the ability to convert capital

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[8] The later books are based on research Bourdieu had conducted in the 1960s.

inhibits power and the capability to function in society, and is useful for the attainment of higher order goals (Niboer & Lindenberg, 2002; Ormel et al., 1999).

Bourdieu's concept of social capital has been made accessible to other sociologists in the English language mainly by the works of James Samuel Coleman (Portes, 1998). Although Coleman does not explicitly refer to Bourdieu in his analyses, he is one of the first English-language sociologists to apply the idea of social capital, with focus on the structural aspect of the concept and how actors behave towards one another given their structural position (Coleman, 1988). Other academics are more inclined to use social capital to describe the functions of social networks, for instance (1) family support, (2) extra familiar support, and the exertion of (3) control (Portes, 1998). The undifferentiated application of the social capital concept is often criticized: access to social resources and the utilisation of these resources should be distinguished (Lin, 2005). Access is the prerequisite to the use of social resources. In summary, the application of the concept of social capital has ignited a debate about how the concept should be applied in practice.

Graph 6: The belongingness-bonding-binding continuum by Lin et al. (1999)
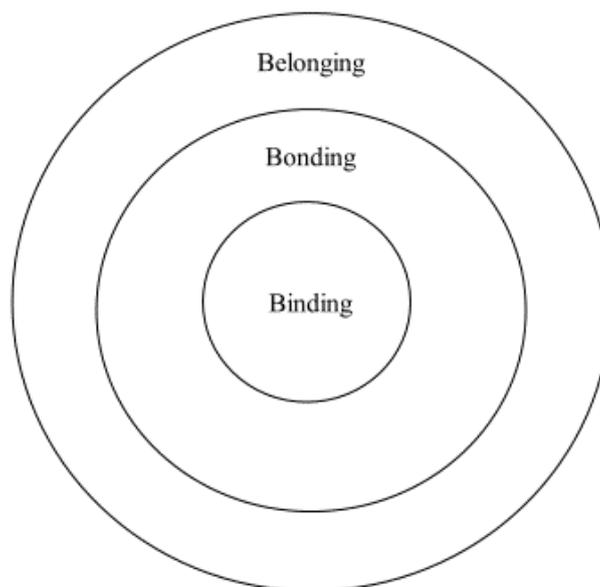
The notion of social capital is also present in the study of mental health. Nan Lin and others apply social capital as a determinant of mental health (Lin, Dean, & Ensel, 1986). The authors have coined the belongingness-bonding-binding continuum (Graph 6), with differential effects on mental health (Lin, Ye, & Ensel, 1999). The binding layer of social capital represents family ties and close friends. The bonding element is the intermediate layer of social relations in a broader social network of friends and acquaintances. Belonging is created on the outer layer with feelings of belonging to a group such as a nationality (see for instance Beiser & Hou, 2017). Consequently, Lin and colleagues attribute different kinds of resources to different kinds of role relations: from emotionally close to distant, from strong to weak. Elsewhere, Lin and colleagues apply the concept of social capital in studying the position of persons in their networks by means of occupation (Song & Lin, 2009). Lin is aware that he is ascribing different meanings to the notion of social capital throughout his studies, and that these must be further distinguished. This conclusion grows in importance if we interpret social capital not only as structure, function, and position, but also as norms, reciprocity, and access to other forms of capital, which are part of the concept as applied in different studies (Putnam, 2000, 2007; Song, Son, & Lin, 2011).

The concept of social capital as coined by Bourdieu is also relevant to the study of migration, albeit not so much in the study of migrant mental health. Individuals who take the decision to migrate do not do so in a vacuum, but with their capital endowments in mind (Charles Tilly 1990 as cited in Faist, 2010, p.66). This perspective highlights the importance of social networks and other resources for migration in general, particularly in the provision of information on how to migrate and where to go. Furthermore, it proposes that migrants are a homogenous group of like-minded and similarly equipped individuals, all located in the same "field of forces". In fact, they occupy different "fields of forces" in their home and host communities and are equipped with different kinds of capital and capabilities (Boyd, 1989; de Haas, 2021). This inequality in capital endowment is also true for the group of refugees. Their initial social capital, for instance, informs them on migration routes and their opportunities for leaving their country of origin (Williams, 2006). Social capital is even said to exist throughout transnational spaces, when individuals can keep contact with families and friends elsewhere (Lamba & Krahn, 2003). Yet it is by no means clear whether all migrants can stay within their "field of forces": First, it is likely that

certain forms of capital are depleted through migration and displacement: losing income, material, and immaterial assets, and contact to social networks. Second, not every form of capital valuable in the home community is also valuable in the host community.

Conceptualisations of social capital have one major limitation: they are not comparable across studies. Adler and Kwon (2002) note that there are as many conceptualisations as applications of social capital. Franzen and Pointner (2007) study the empirical difference behind the various prevailing applications of the concept, distinguishing between network-based resources, trust, and norms. They show, by means of an exploratory factor analysis, that the different items that function as proxies for the concept do not measure the same concept. In fact, the authors establish four factors: membership, social networks, friends, and trust. These factors correlate only weakly with one another. Franzen and Pointer argue that, based on the prerequisite of investments, the social capital notion should only be used for networks and their network-based resources (Franzen & Pointner, 2007). Saying this, norms, and trust as determinants of mental health will not be further studied in this dissertation. To date, these sub-concepts in the family environment and among ethnic groups are mainly studied qualitatively in the refugee population and mostly only implicitly in association with mental health (Weine et al., 2004, Choummanivong, Poole, & Cooper, 2014).

The next two sections introduce these more fine-grained concepts of social networks and social support. While the study of social networks has not found its way into the health sciences, the concept of social support has gained a lot of resonance in this area. I argue for the necessity of both an examination of (1) network structure and (2) the support provided therein separately and jointly, as use of resources presupposes access.

4.2 Social networks: the structure

In studying network structure, we analyse "[…] egocentric networks with an individual at the center as well as entire networks of networks at the level of communities or workplaces." (Berkman, Glass, Brissette, & Seeman, 2000, p.845). Structure indicates the relations of several individuals to one another, enabling a theoretical perspective on how social structures "constrain network members' behaviour" (Hall & Wellman, 1985, p.26). In the study of social networks as structure, the subject of interest are nodes, meaning individuals, and how they link and do not link to one another, referred to as ties or linkages (Yang, Keller, & Zheng, 2017).

Graph 7: Egocentric network with four alters (A) and one ego
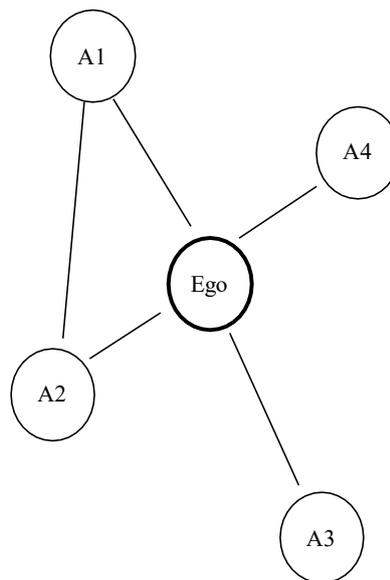
The degree of "capital" inherent in social structures is famously defined by Mark Granovetter (1973). Granovetter differentiates between ties that are absent and those that exist (for a visualisation see Graph 7), albeit at varying degrees from strong (direct link such as from ego to A1) to weak ties (for instance the relationship of A2 and A3 here, only coming about via the ego). By theoretically observing a triad relationship between three individuals (for instance ego, A1 and A3 in Graph 7) and ties between them, he argues that some relationships form bridges: ties which only come about by means of an intermediary (in this case the ego). Otherwise, such ties remain absent. The conclusion: those with many weak ties

are in a good position to disseminate a lot of information but also receive a great amount of new information.

Coleman, also discussed in this dissertation in terms of his use of the notion of social capital, studies social structure and actions. He argues that a structure is the foundation upon which individual action with respect to another person takes place (Coleman, 1988). In a first line of argument, he raises the importance of trust and reciprocity in governing social relations and determining the strength of linkages (Coleman, 1988). Second, Coleman highlights the potential of information exchange in relationships, signalling the form of capital in the social structure – another word for resources or support (Coleman, 1988). Third, he introduces norms governing the basis on which ties exist and are destroyed. From his point of view, norms govern the way we interact with each other and sanction individual actions through socially determined standards (Coleman, 1988). This relates to social networks in that norms are hypothesized to be strongest in closed network structures, where the rules are enforced collectively (Graph 7: ego and A1 and 2) – Granovetter would have referred here to "strong ties". Yet, closed networks, he argues, also increase the risk of having limited information, or being sanctioned for not conforming to the norms, with negative implications (the strength of weak ties argument). Coleman shows how particularly strong ties (with direct links among nodes), in the family as well as in the community, translate one form of capital into other.

Other indicators of network structure are also discussed. Burt's studies show that the size of a network in which individuals can discuss important aspects of their lives is positively related to happiness. The network size alone already shows a direct effect, but the study also suggests that the content of relationships is equally important for happiness (Burt, 1987). Structure and function of a social network are inherently different but interconnected. On the one hand, Burt argues that one mechanism tied to happiness is trust between individuals in a network; information but also sanctioning mechanisms which unite individuals (Burt, 2000). On the other hand, Burt reflects on a second network mechanism, namely the competitive advantage someone has if they can span networks across "structural holes"[9]. This

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[9] The structural hole can be best visualized from Graph 6, looking at the relationships of A2 and A3, A1 and A4, or A3 and A4, which only exist via the ego – spanning an imaginary hole.

mechanism is related to the argument brought forward by Granovetter and the "weak ties". Overall, Burt proposes three kinds of networks: (1) clique networks, (2) entrepreneurial networks, and (3) hierarchical networks (Burt, 2000). The first group is very interconnected but does not span holes (high degree of network closure), while entrepreneurial and hierarchical networks engage to a larger extent in spanning holes in the structure of information provision, forming bridging ties. Hence Burt, like Lin, sees networks as concentric circles from close to more distant network members. In conclusion, the power of network structure is seen in both strong and weak ties.

Nevertheless, the network approach to social relationships comes with limitations that have led health scientists to avoid using it: the hypothesis for network size and its implications for mental health exist, but causal testing is often lacking (House, 1981). The network approach is rather sparsely applied given the limited network data available to study group structures (House & Kahn, 1985). Moreover, Cohen and Wills (1985) argue that examining network structure is not a proxy for studying network function. Hall and Wellman (1985) are equally critical, albeit cautiously, as they consider measures used to study social networks as structures to be sometimes metaphorical. For instance, weak ties are often not assessed structurally but inferred from membership in voluntary or religious groups. Last, one should keep in mind the diminishing return of social networks: a larger network does not automatically have positive implications in the realm of health (House & Kahn, 1985).

4.3 Social support: the function

Initially, the association between social capital and social network structure might be thought advantageous to the study of the relationship between the social sphere and mental health. In the 1970s, however, health sciences were reinvigorated by a different discussion, surrounding social support and psychosocial pathways. As famously described, "social support is defined as information leading the subject to believe that he is cared for and loved, esteemed, and a member of a network of mutual obligations"(Cobb, 1976, p.300). The notion of social support was mainly introduced into the study of health by Cassel and Cobb. They show, in studies of animals, how changes in the size of an animal's

network alters its health status, even holding other aspects of the environment constant (Cassel, 1976). Cassel highlights, firstly, the stress buffering role of others. Furthermore, when comparing two factors of stress and support, the latter can be more easily altered. Hence, this concept marks an important starting point for the study of remedies for mental health languishing (Cassel, 1976). Cobb brings the study of social support and mental health into the human sphere, examining the stress buffering of social support in the wake of pregnancy, childbirth, schooling, hospitalisation, or employment termination (Cobb, 1976). Simultaneously, the study of social isolation emphasizes the negative effects for mental health, given absence of a network and its function (Berkman & Syme, 1979).

With this new terminology finding its way into the study of mental health, research was concerned with delineating the different prevailing concepts. House (1981) postulates different kinds of social support, of which he sees emotional support[10] as the most important function in determining mental health, provided mostly by strong ties. A myriad of longitudinal household studies enable, for the first time, a more detailed look into the make-up of social support provision, with links to mortality and other health outcomes over time (Berkman & Syme, 1979; House, Robbins, & Metzner, 1982). House and Kahn continue to bring more light into the differences of measures and concepts, conceptualizing the term 'social network' as inherently structural, and social support as a description of function (House & Kahn, 1985). The authors postulate the importance of studying these different aspects of social relationships independently to understand their differing contributions to mental health.

The more prominent the study of social support and mental health, the more fine-grained the questions evolving around the association become. Cohen and Wills (1985) provide arguments for a direct effect between social support and mental health, as well as an indirect effect that takes place in the event of adverse and stressful events. The indirect effect, or stress buffering, is a result of coping support provided through others, as well as guidance on how to manage a specific stressful situation. Nevertheless, the negative side of having supportive structures are the costs of support provision (House

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[10] Other forms of support advanced in the health sciences are informational support, instrumental support, and appraisal support (House, 1981).

& Kahn, 1985). This argument returns to the norms and reciprocity governing social relations, already problematized in the study of social capital.

Graph 8: Simplified flow diagram of network structure and function pathways to mental health proposed by Berkman, Glass, Brisette, and Seeman (2000)

Graph 8 gives an excellent overview of how social networks, social support, and the relevant pathways interact in influencing mental health, provided by Berkman, Glass, Brissette, and Seeman (2000). It presents the social network structure as the starting point. From the structure, the model postulates a flow to social support or the function of the network (psychosocial mechanism). Last, the authors derive different pathways for how structure and function affect mental health. This model is still being developed further today, as it has been proposed that network structure and function both have their individual direct effects on health, as well as indirect effects (Heaney & Israel, 2008). Moreover, reversed causality has also been proposed, from our mental state to how we connect with others (Heaney & Israel, 2008). Meanwhile, Kawachi and Berkman (2001) find support in the literature for the direct and indirect effects of social support on mental health. They also study the social sphere of individuals in concentric circles, similar to the proposition made by Lin et al. (1999) and Burt, studying egocentric networks nested in larger communities. This recurring theme provides reason to focus initially on the close networks of refugees, before understanding access to and function of broader refugee social networks.

A more recent addition to the discussion on direct and indirect effects of social support is that of Peggy Thoits (2011). First, like Wellman and others (Hall & Wellman, 1985; Lin et al., 1999; Wellman &

Wortley, 1989) she is an advocate of observing role relations: understanding the meaning of a specific interpersonal relationship, such as observing companionship in a couple or the role of parent-child relations (in line with Cohen and Wills (1985)). Second, she theorizes how mechanisms are at play in direct and indirect situations of social support. On the one hand, she argues that the direct effect hypothesis can be explained by the mechanisms of social influence, social control, behavioural guidance, self-esteem, sense of control, perceived support, belonging, and companionship formed daily. Under the indirect effect hypothesis, Thoits proposes active coping as the mechanism at play (found as a psychosocial pathway in the model of Berkman et al. 2000). She also proposes that the kind of underlying mechanisms differs when looking at intimate personal relationships and relationships with similar individuals who can relate to a specific circumstance. This line of argument can guide our thinking regarding the networks of refugees, consisting of families and refugees with similar experiences, in comparison to similar connections in the host population.

The social support literature is predominantly applied by health scientists and social epidemiologists. This literature has developed its own terminology and particular associations with the social sphere on mental health. The different terms complement each other, with the concept of social capital often "hovering" above the other concepts. Not surprisingly, the different research traditions have, at different junctures, cross-referenced each other. Ultimately, it is this continuum of network structure, having a potential influence on network function or social support that influences mental health (Graph 8).

4.4 The negative effects of the social environment on mental health

Having introduced the different sociological and health research traditions providing explanatory power for a mostly positive association of the social environment with mental health, the opposite effect discussed in the literature receives mentioning as well.

The social network and social support theory suggest that the absence of a network and support is detrimental for mental health. The size and density of a network can be an expression of solidarity, trust, and a common understanding of norms and rules. However, one could also frame these elements

as constraints, as norms might be enforced on the members of the network (Burt, 1992). In terms of competing with others, two characteristics advance the position of an individual relative to others, depending on his or her position and the ability to use structural holes: information and control (Burt, 1992). Those who bridge structural holes hold potentially new information, or at least information unknown to others. This in turn influences control and power, with negative consequences for those not having access to resources and unable to substitute (Niboer & Lindenberg, 2002; Ormel et al., 1999).

While Burt illustrates these inequalities in information and power in the area of management and market players, this theory also holds in other contexts, such as among ethnic groups, in which people with similar socio-economic characteristics meet and exchange information (McPherson, Smith-Lovin, & Cook, 2001) but might be unable to have access to important novel information. Therefore, they might also be under the influence of others in their group, with little means to find alternatives. Having a lower level socioeconomic status, as measured by living below the poverty line, and having large in-group exposure towards the same ethnic group limits access to protective factors for migrants, as shown in relation to the ability to tackle depression (Tulin & Smith, 2020). Saying this, social networks can also be hypothesized to have a negative association with refugee mental health.

This conclusion is important as it leads us to question the very general network related assumptions that network structure is in fact always a positive resource. As will be discussed below and in the empirical chapters, there is reason to believe that certain network characteristics and role relations have no distinct and even a negative influence on refugee mental health.

5. **Application of the concept of social networks and mental health in the migration and refugee context**

The sociological, psychiatric, and epidemiological concepts are not often considered together, as in the case of social network structure and mental health. The reason for this originates from the different aims that exist in sociology and the health sciences. Health sciences are primarily interested in the stressors that cause health problems and incidences of mental illness. The fact that stressors, and particularly the

lack of social support, can have a structural origin is often overlooked (Pearlin, 1989). Meanwhile, those applying social network tools often have very sophisticated data at hand but little interest in health as an outcome of structural disadvantages. Literature reviews recall the necessary differences in studying ego-centric networks as well as socio-centric or group networks to understand migrant decision-making and well-being (Bilecen & Lubbers, 2021). Nevertheless, the discussions mostly end with the call for more sophisticated network data. However, this pressure to provide novel data can limit the attempt to retrieve knowledge from existing data.

Still, the network approach is one that has found its way into migration research. Not only is the structure of migrant networks studied to understand the pre-migration phase, migration paths and post migration lives (Lubbers et al., 2010; Vacca, Solano, Lubbers, Molina, & McCarty, 2018); one can also further differentiate by comparing the structure and the meaning of the relevant networks. This latter approach, focusing on role relations in migrant networks, allows us to insert culture into the study of structure (Bilecen & Lubbers, 2021). Studying migrant networks is particularly relevant in understanding integration in host societies, with a specific focus on how new ties with the host population become an integral part of everyday migrant life. Some even argue that the study of network expansion is needed in order to fully understand migrant integration (Facchini, Patacchini, & Steinhardt, 2014). Migrants might be primarily connected with people with a same ethnic background, with little access to other social networks and inherent resources (Cranford, 2005; Portes & Zhou, 1992). Other researchers distinguish between the study of national and transnational networks of migrants (Bilecen, Gamper, & Lubbers, 2018; Bilecen & Sienkiewicz, 2015; Bojarczuk & Mühlau, 2018; Dahinden, 2005; Herz, 2015; Viry, 2012), showing how resources are exchanged in cross-borders networks. While the network approach has been adopted in migration research, the intersect with health as an important outcome is not widely studied in the migration literature, let alone in the context of forced migration. Ager and Strange make health a part of their integration framework, independent of but also linked to social connections (Ager & Strang, 2008).

Access to health as an integration outcome in the refugee population is also a subject of research, yet with little side-investigation into other resources existing, such as social resources. Asylum seekers
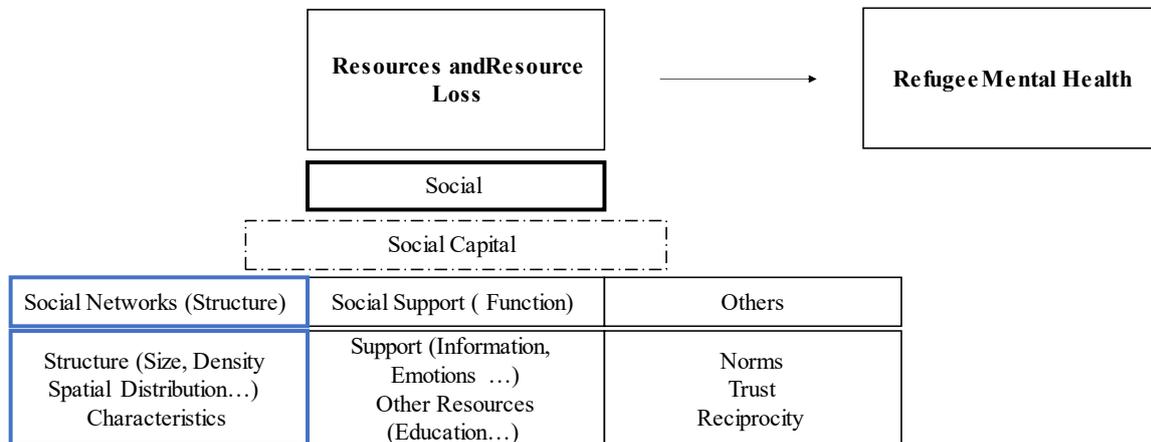
often do not have equal access to health care (and hence mental health care) compared to the host population. In Germany, for instance, asylum seekers not recognized as refugees receive "necessary treatment" for acute disease or pain in form of a voucher system.[11] Only after 18 months residency in Germany do they become part of the broader health care system by means of the Social Code Book XII (*Sozialgesetzbuch*). Even then, access to trauma therapy and other forms of mental health support is difficult (Baron & Flory, 2019). Proponents of limited access point to healthcare as a driver for irregular migration and the high costs associated with providing services (Bozorgmehr & Razum, 2016). In the German context, opponents to restricted access highlight that (1) other countries grant equal access immediately, (2) Germany already provides similar access to the unemployed, and (3) that entitlement restrictions create more costs in the long run (Bozorgmehr & Razum, 2015). Nevertheless, individual constraints to health services also exist: suspicion of the health system, language barriers, the difference in understanding health conditions, unusual diseases, and the time required to heal make treatment of refugees a difficult undertaking (Robertshaw et al., 2017). Despite these challenges, treatment for refugee mental health has advanced in recent years with innovative treatment practices. Multiagency teams not only deliver health services but co-deliver other important services for livelihoods, such as the reduction of stressors (Robertshaw et al., 2017). In the creation of trust, peer refugee interventions leverage family, friendship, and co-ethnic networks for support and treatment (de Graaff et al., 2020). Digitally-driven and culturally sensitive pilot studies promise new angles in the provision of mental health treatment to refugees (Böge et al., 2020). And also mentoring programs, increasing the social network, have their role to play in support provision in general (Eisnecker et al., 2016; Gericke, Burmeister, Löwe, Deller, & Pundt, 2018; Joona & Nekby, 2012; Månsson & Delander, 2017; Portes, 1995).

Still, the association between refugee social networks in general and mental health specifically is not systematically investigated. This link is an important one, as it enables the discussion and analysis of different interventions, besides the established psychiatric treatment with medication (see above). This dissertation studies the relationship between social network structure and mental health as an important

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[11] § 4 AsylbLG (*Asylbewerberleistungsgesetz*)

prerequisite to other integration outcomes of refugees (Graph 9) (Ager & Strang, 2008; Bakker et al., 2014).

Graph 9: The social resource model

Resources andResource Loss	→	Refugee Mental Health

Social

Social Capital

Social Networks (Structure)	Social Support (Function)	Others
Structure (Size, Density Spatial Distribution…) Characteristics	Support (Information, Emotions …) Other Resources (Education…)	Norms Trust Reciprocity

6. This dissertation: understanding refugees' social networks and mental health

In this dissertation, a sociological perspective is applied to the study of refugee mental health. There is already a broad understanding of the incidence of mental illnesses among refugees and determinants related to the phase of forced migration, such as torture, and post-migration living difficulties (Fazel et al., 2005; Nickerson et al., 2010; Silove et al., 1997). Particularly the resource model of refugee mental health (Ryan et al., 2008) has paved the way for the study of forced migration stressors in their entirety. Yet, the broader social structures in which these strains are taking place are less well understood. Therefore, I apply theory on social resources, their characteristics and mental health to refugees in this dissertation, filling important theoretical and empirical gaps.

Theoretically, in choosing mental health as an outcome instead of focusing on mental illness, this dissertation applies the view of health as a continuum. Only looking at extreme forms of mental disorder neglects the magnitude of the everyday mental health impairment refugees experience, besides defined mental illnesses. Inserting this outcome into the resource model of refugee mental health, the model is

adapted to the need for a deeper understanding of the mental health continuum across an entire refugee population, instead of focusing on the severely ill. Moreover, this dissertation disentangles different traditions of looking at social resources and mental health and argues for the study of social network structure as a starting point that is often neglected in the study of refugee social resources.

Empirically, this dissertation tests assumptions on the direct association between social network structure and refugee mental health that have been found to be applicable in non-refugee contexts. In the previous section, three forms of social resources were explained in more detail in relation to mental health: (1) social networks (structure), (2) social support (network function), and the loosely associated concepts of (3) norms, trust, and reciprocity that are often discussed in the study of social capital. In the following, I will recall the knowledge already existing in the field of social networks and refugee mental health (see Graph 10 for a visualisation). Besides, I highlight which of these concepts and related mechanisms are studied in this dissertation with regards to the refugee population specifically.

Social network (structure): Evidence on the relationships between social network structure and refugee mental health is mainly qualitative in nature. The majority of studies include a qualitative analysis of role relations (Thoits, 2011) and highlight which role family members – mainly spouses – play in general and for emotional social support provision specifically after resettlement (Savic et al., 2016; Sossou, Craig, Ogren, & Schnak, 2008; Whittaker, Hardy, Lewis, & Buchan, 2005). Besides the nuclear and extended family, bridging ties in the form of friends also play a role for mental health, particularly among refugee women (Beiser & Hou, 2017). There is, however, hardly any quantitative evidence how large refugee family networks are, how they are geographically dispersed and how dense and reciprocal relationships are. The spatial distribution of refugee networks is studied in narrative accounts only: While some refugees report an ongoing exchange with a (family) network abroad, in terms of communication but also sending home remittances (Williams, 2006), others report stress associated with this separation (Earnest, Mansi, Bayati, Earnest, & Thompson, 2015; McNatt et al., 2018; Nickerson et al., 2010; Phillimore, 2011).

Social support (function): As explained above, the network function of the family is often discussed in relation to role relations being present, mixing the structural and the functional component of the

refugee social network. One might assume that based on a strength of weak tie argument, friends, and acquaintances as well as ties with people from the host community have additional supportive character, with the possibility of receiving novel kinds of support. However, qualitative evidence also shows that refugees sometimes and at least subjectively do not evaluate these sources as supportive as kinship ties (Williams, 2006). A study that clearly maps different kind of support provisions by different kind of members in the refugee network has not been conducted up to today, let alone their link to mental health.

Other: Studies looking into norms, trust, and reciprocity highlight the mitigating role of close-knit networks in narrative accounts as well. The experience of war, violence, and other pre-migration resource loss changes family dynamics in terms of communication, memory, roles, and obligations (Weine et al., 2004). Particularly generational conflicts arise as younger refugees adopt to new environments while older refugees intend to preserve traditions from their lives before resettlement (Choummanivong, Poole, & Cooper, 2014).

In conclusion, there is neither quantitative evidence on the structure of refugee networks after resettlement in relation to mental health outcomes nor studies on the support provision in refugee networks. Yet, these resources are important as they can be altered in the host community and serve as means to other goals in life of refugees.

Graph 10: Evidence of social determinants on mental health in the context of forced migration. The dimensions discussed already in previous studies, mostly qualitative in nature, are circled in blue below the concepts.
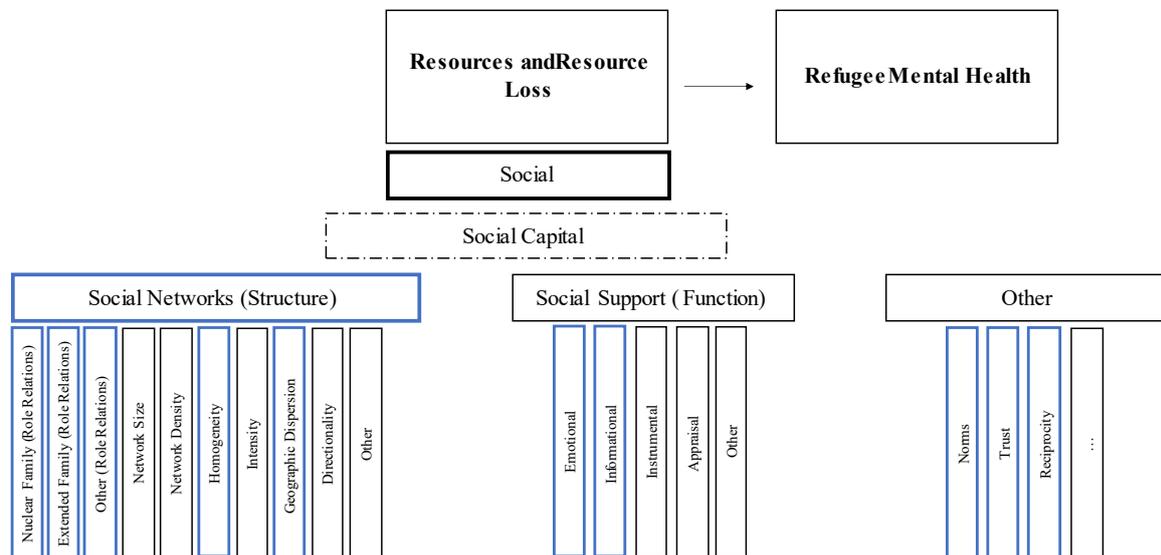
Resources and Resource Loss → Refugee Mental Health

Social

Social Capital

Social Networks (Structure) | Social Support (Function) | Other

Nuclear Family (Role Relations) | Extended Family (Role Relations) | Other (Role Relations) | Network Size | Network Density | Homogeneity | Intensity | Geographic Dispersion | Directionality | Other

Emotional | Informational | Instrumental | Appraisal | Other

Norms | Trust | Reciprocity | …

Note: Network size refers to the number of individuals with whom a person has a relationship, density is a description of the network pointing out the extent of connection among groups of network members. Homogeneity refers to an indicator of demographic similarity among individuals in a network and intensity to frequency of contacts. The directionality of linkages can be an indicator of power relations and network-based resources, that are often also referred to as social capital, can be the education or employment status of those an individual is linked to.

Starting from the idea that social networks are the basis for the exchange of social support and other (social) resources, this dissertation sets out to study the direct link between social network structures and refugee mental health quantitatively, with a specific focus on the family network. This dissertation advances knowledge on how network structure and particularly the family network affect refugee mental health (Table 1). Overall, the dissertation asks: _how do (kinship) social networks influence refugee mental health in the aftermath of migration?_

Before analysing in more detail the networks' structure and their direct association with refugee mental health, this dissertation begins with one fundamental question: Does the susceptibility of a social network in relation to mental health differ between refugees and the host population? This question taps into the debate on migrant and refugee vulnerability. Evidence repeatedly shows that migrants, for instance, are less socially integrated (Koelet & de Valk, 2016; Ten Kate, Bilecen, Steverink, & Castle,

2020) and feel lonelier (De Jong Gierveld, Van Der Pas, & Keating, 2015; Lim, Eres, & Vasan, 2020). These findings are a description of level differences in different integration dimensions in the social and mental health sphere and have not been established for refugees quantitatively. Moreover, the description does not provide proof for an increased susceptibility, meaning a stronger association between stressor and health outcome, compared to other populations without the experience of forced migration. Based on evolutionary theory, the association should not differ significantly based on migration background or cultural differences (Cacioppo & Patrick, 2008).

1. In a first analysis, the dissertation disentangles the differences in size of association between the absence of social networks and a well-being outcome among the German host community, migrants, and the refugee population. It asks the question: *How does the migration experience alter the association between social embeddedness and mental health?*

The first empirical chapter (Chapter 2) uses the concept of social isolation as a composition of different items related to network structure and support to study the association between mental health and loneliness specifically. It tests competing hypotheses regarding the differences in associations between social isolation and loneliness among refugees, in comparison to the German host population and other migrants living in Germany. This analysis investigates whether the direct association between social networks and support on the one hand and mental health (loneliness) on the other hand varies to a significant extent across groups. Its findings add to the knowledge on health inequalities and the vulnerability of refugees when compared to host populations and other migrants.

Further, this dissertation continues to focus on refugee family networks and their relationship with mental health. General network theory has advanced the argument that size matters for the provision of social support and hence improved mental health. Looking at the size of the family network and the role relations therein, the argument is advanced that particularly close-knit or large networks provide emotional sustenance for health (Burt, 1987). This argument falls, on the one hand, within the discussion on the closeness of networks (Burt, 2000; Coleman, 1988). In line with Thoits' direct and indirect hypothesis (Thoits, 2011), close networks and those networks with similar experiences are in the best position to support positive mental health in the aftermath of trauma. In the case of refugees, such a

network would be the family and potentially other members of the refugee population. This dissertation focuses on the former. Moreover, concerned with the spatial distribution, research into migration networks has brought to light that transnational networks are a source of support. Even the existence of a network which is scattered spatially should be a source of emotional comfort (Herz, 2015; Viry, 2012), with implications for mental health. Conversely, the fear of remaining separated from family might provoke a different outcome for refugees (Nickerson et al., 2010). By looking into the spatial distribution of the refugee kinship network and into the creation of proximity between family members, the closest of all role relations, this dissertation explores the conflicting arguments for an actual social resource loss during forced migration.

2. In a second analysis, the dissertation takes stock of refugee family networks and the way their spatial distribution affects refugees' mental health in the aftermath of migration. It seeks answers to the question: *What forms do refugee family structures take after resettlement and how is this structure associated with refugee mental health?*

After having established the structure of the relevant social networks and potential loss via involuntary decrease in spatial proximity during forced migration, this paper sets out to study social resource gains. Specific to the migration context, family reunification is a means to re-establish a social network geographically more closely and is studied in this dissertation in a follow up to the second research question. While narrative accounts allow us to hypothesize that family reunification is positively associated with refugee mental health, no study has so far proven this to be true. Family reunification could also be source of decreasing mental health, for instance when family roles change and some family members adapt earlier than others (Suarez-Orozco et al., 2010; Suarez-Orozco, Todorova, & Louie, 2002).

3. In a third analysis, the dissertation observes the frequency of but also the association between family reunification and mental health in the realm of refugee migration, as a first intervention altering the social network of refugees and thus also mental health. The analysis seeks answers to the questions: *Can the spatial alteration of the family structure be supportive for refugee mental*

health, and how does this association between social network structure change and mental health

differ by gender?

7. Data and context

This study takes place in the German context. Germany has seen a peak of applications for asylum, particularly between the years 2013 and 2016, linked to the Arab Spring, compared to earlier phases in refugee migration (Graph 11). Demographically, the majority of refugees arrived from Syria, followed by Afghanistan, Iraq, and Turkey (BAMF, 2021). Refugees in this latest period of refugee migration to Germany are predominantly young (18-25 years of age) and male (61.3% male asylum applicants in January and February 2021 as a reference) (BAMF, 2021). In 2020, 26.1% of applications received formal recognition, in that those individuals were granted a formal refugee status. Moreover, 13.1% received subsidiary protection; 32.1% applications were rejected. All others either received a ban on deportation or received a formal decision (BAMF, 2020).

Graph 11: Refugee migration over years in Germany (BAMF, 2021)
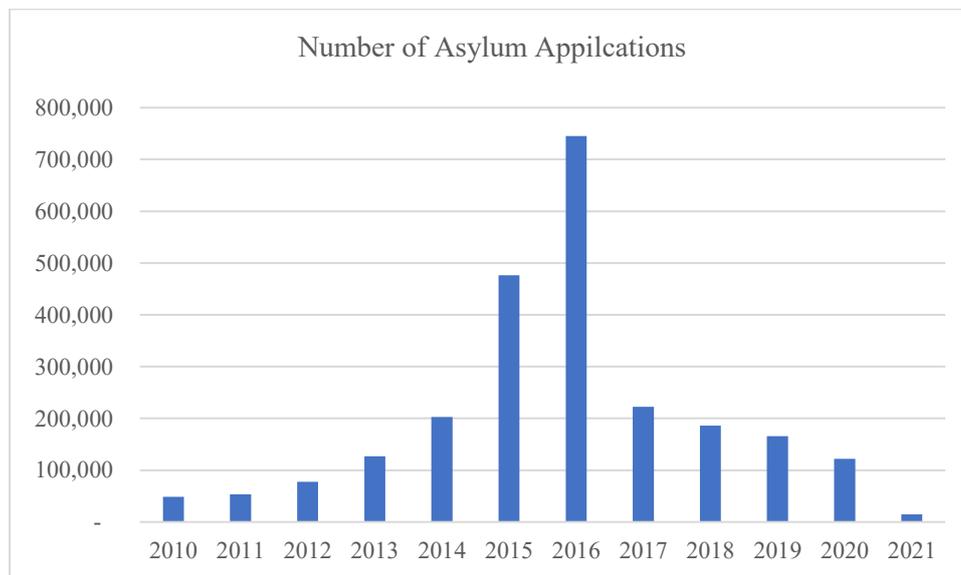
Note: Data for 2021 only availbale until March

To study this specific context, this dissertation applies data from the German Socio-Economic Panel Study (SOEP), the largest random sample of German households (Goebel et al., 2019).[12] The survey's first year was 1984. Many refresher samples followed to account for the changing structures of German society. As early as 1984, migrants were part of a specific sample frame. Additionally, throughout the random sampling approach, migrants and refugees were included in the samples over the years (see Graph 12 for a representation of refugee person years in the random samples as in v.35). However, these groups were not asked specific questions linked to their migration trajectories.

Graph 12: Number of refugees in the SOEP (v.35), by sample (own calculations showing person-years per sample).
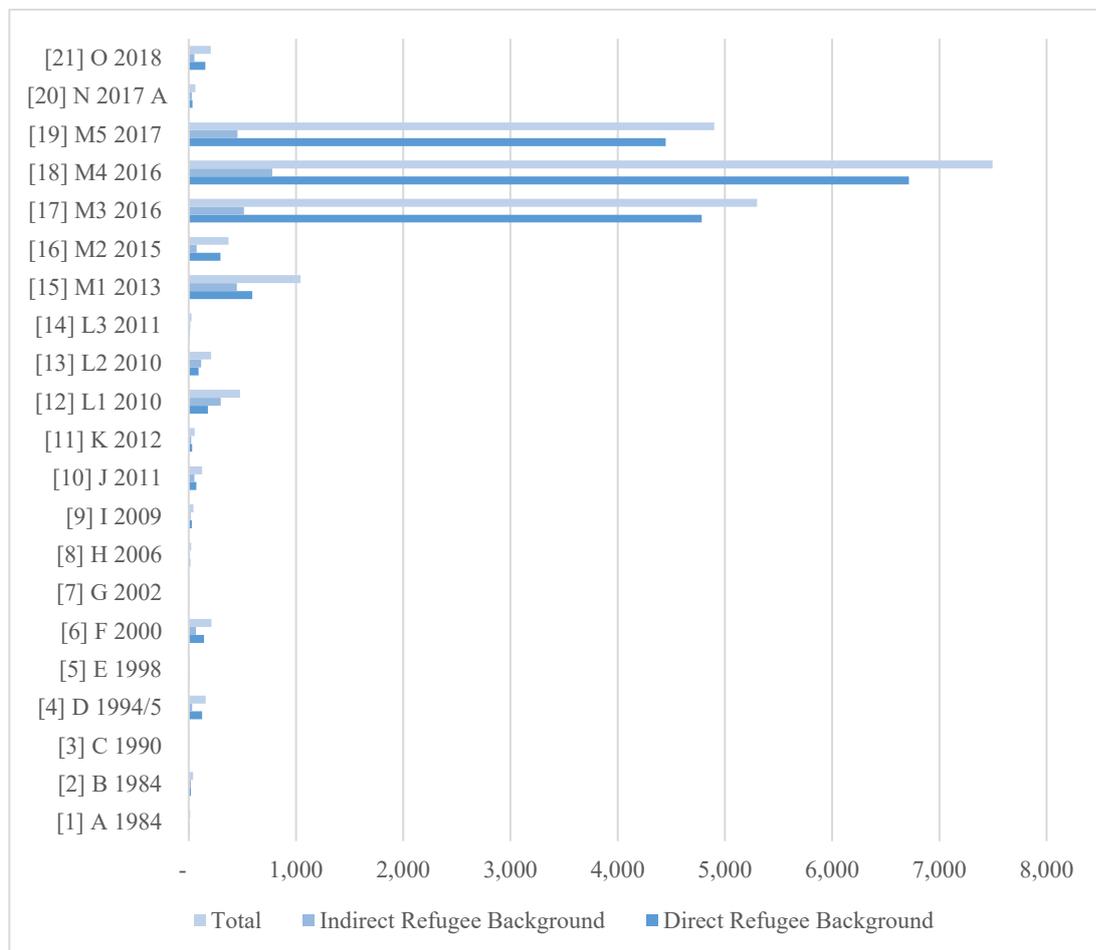
With the changing socio-economic composition of German society, recent additional samples started to target, in particular, labour migrants and refugees, making analysis of their migration and integration possible. Notably for this dissertation, the roll-out of the IAB-BAMF-SOEP Survey of Refugees makes it possible to study a large sample of refugees, including their experiences before, during, and after migration (Jacobsen, Krieger, Schikora, & Schupp, 2021).

Samples M3 to M6 make up the refugee survey of the SOEP in 2020. At the time of the dissertation, M3–M5 were available (Kroh, Kühne, Jacobsen, Siegert, & Siegers, 2017; Schupp, Brücker, Kroh, Leistner-Rocca, & Goebel, 2016). The sampling frame for this specific survey is the registry of foreign nationals, the *Ausländerzentralregister,* administered by the Federal Office for Migration and Refugees (BAMF). The sample is thus representative for the refugee population in Germany that arrived between 2013 and 2016. By means of stratified random sampling in 2016, participants were randomly selected in 2016 for the first household interviews (samples M3 and M4). In order to account for late registrations with the registry due to the overburdening of the administration during that time, the sampling was repeated 4 times in the first year (Kroh et al., 2017). Moreover, families were oversampled, allowing for family analysis in a sample that would otherwise be dominated by single young male refugees (Kroh et al., 2017). Graph 12 shows how the number of refugee person-years in the SOEP increases through the additional M samples. In 2017, M5 became an additional sample, meant to refresh samples M3 and M4 and to enlarge the sample to include individuals who only registered with the *Ausländerzentralregister* by the end of 2016 (Jacobsen et al., 2019).

The SOEP comes with several advantages in studying refugees in Germany: First, being representative of the refugee population for a specific time frame, it goes beyond the usual convenience samples used in the psychiatric literature. Second, the study has a relatively large number of observations per year and provides migration-specific questions as part of an all-purpose household survey. This framework enables the testing of a social resource model of mental health and the specific social environment the refugees live in. Third, a variety of health-related variables allow the study of mental health as proposed in this theoretical framework.

8. References

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CHAPTER 2

The association: social isolation and loneliness within host, migrant, and refugee populations

How migration status shapes susceptibility to social isolation - A comparison of the relation between social isolation and loneliness in refugees, migrants, and the host population in Germany

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Abstract

Migrants and refugees experience differential exposure to social isolation and loneliness compared to host populations. Our research provides competing hypotheses and empirical evidence for how the association between objectively experienced social isolation and subjective loneliness differs for host populations, migrants, and refugees in a country. The analysis makes use of survey data of 25 171 participants from a stratified random sample of the German population (SOEP v.35, 2016/17). We estimate regression models for the host population, migrants, and refugees separately and test five hypotheses regarding the relative magnitude of the association between social isolation and loneliness using a Bayesian evaluation approach. We assess robustness of the results in a multiverse framework with 1920 plausible scenarios. We find the strongest relative support for an increased need for social inclusion among refugees, indicated by a higher Bayes factor (1.62-2.87) compared to the host and migrant population. However, all theoretically developed competing hypotheses perform poorly in absolute terms in explaining the major pattern in our data: The association of social isolation and loneliness is persistently lower for migrants (posterior means ranging between 0.15 SD and 0.29 SD), with similar sizes of associations for refugees (0.4 SD and 0.67 SD) and the host population (0.38 SD and 0.65 SD). In a population-based survey, we show the varying associations between social isolation and loneliness, highlighting similar patterns among refugees and host population, while migrants are found to be less susceptible to the association with loneliness of social isolation.

1. Introduction

Loneliness has been called a pandemic of modern times (J. T. Cacioppo & Cacioppo, 2018; Holt-Lunstad, 2017), constituting a severe problem for modern societies. It has been associated with an increased risk of developing mental health problems (Jessen, Pallesen, Kriegbaum, & Kristiansen, 2018; Lee et al., 2019; Thurston & Kubzansky, 2009) and can exacerbate existing vulnerabilities to other health outcomes (Tsur, Stein, Levin, Siegel, & Solomon, 2019). Several societal trends have been proposed as explanations for increased risks of loneliness in recent decades, among them global mobility (Djundeva & Ellwardt, 2019). In 2019, 272 million migrants lived outside of their home country (United Nations Population Division, 2019). At the same time, UNHCR counted 25.9 million refugees, 41 million internally displaced persons, and another 3.5 million asylum seekers (UNHCR, 2019).

Loneliness is defined as the subjective feeling of disconnection from social interactions in everyday life (de Jong Gierveld, van Tilburg, & Dykstra, 2006). It is the cognitive evaluation of the objective absence of social networks and support. The objective aspect of the definition of loneliness, absence of a social support network, is often referred to as social isolation (Victor, Scambler, Bond, & Bowling, 2000). Although social isolation and loneliness are often used interchangeably (Malcolm, Frost, & Cowie, 2019), they are not identical (Beutel et al., 2017). While social isolation does not per se invoke feelings of loneliness (Victor et al., 2000), it is an important predictor of loneliness throughout the entire life (Luhmann & Hawkley, 2016; Soest, Luhmann, Hansen, & Gerstorf, 2020). It is therefore important to know under which conditions social isolation works as a strong predictor for loneliness and hence identify more susceptible groups. Following Diderichsen and colleagues, we use the term differential exposure denoting the differences in incidences of social isolation and loneliness among the groups under investigation. Further, we refer to the differences in the strength of the association of social isolation with loneliness between the groups as *differential susceptibility to social isolation* (Diderichsen, Hallqvist, & Whitehead, 2019).

Migrants are more often at risk of greater exposure to social isolation than host populations, as their networks in the new environment need to be (re-) established (Koelet & de Valk, 2016; Ten Kate,

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Bilecen, Steverink, & Castle, 2020). Additionally, they are prone to experiencing higher rates of loneliness due to cultural differences and language barriers (Lim, Eres, & Vasan, 2020). Whether comparable trends to exposure to social isolation and loneliness exist for refugees has yet to be established. In the current study, we not only study these groups' risks of suffering from objective and subjective social network deprivation: The economic, legal, and social differences in context motivate our investigation of the question whether – under the condition of social isolation – migrants, refugees, and the host population exhibit differing susceptibilities to social isolation. Answering this question can guide interventions and their prioritization in this area.

We propose competing hypotheses for differential susceptibility to social isolation. These hypotheses imply that host population, migrants, and refugees differ in reaction to the lack of social networks and support given their different circumstances (Table 1). To test the hypotheses, we use one of the few available data sets which includes comparable and harmonized data for refugees, migrants, and the host population, the German Socio-Economic Panel Study (SOEP, v.35) (N=25,171). We use a Bayesian Evaluation of Informative Hypotheses (BEIH) framework to evaluate the hypotheses (Klugkist & Mulder, 2008; van de Schoot, Verhoeven, & Hoijtink, 2013), testing the robustness of our results in a multiverse framework (Simonsohn, Simmons, & Nelson, 2019; Steegen, Tuerlinckx, Gelman, & Vanpaemel, 2016).

2. Competing hypotheses

H_1: *The contextual relevance hypothesis* – From an evolutionary perspective, feeling lonely is a warning sign of the human body. It indicates the deviation from a norm of socializing and hence the presence of a potential hazard in being unprotected without social support of other humans (J. T. Cacioppo & Patrick, 2008). Research suggests that this mechanism has been established relatively early in human history and has coined the structure of the human brain to be sensitive to feelings of loneliness (J. T. Cacioppo & Patrick, 2008; S. Cacioppo et al., 2016; Hawkley & Capitanio, 2015). Hence, from a perspective of evolution we would expect susceptibility to loneliness in all human cultures and

conditions. Further, a stronger version of this hypothesis – given a non-clinical, non-institutionalized context - would expect social isolation to predict loneliness to a similar degree, regardless of the context, and in consequence also regardless of migration background. This focus on commonalities between migration groups could be dubbed the *evolutionary dominance* hypothesis. Given that social circumstances and exposure to prior (possibly critical or traumatic) experiences vary greatly between migrants, refugees, and host population, we propose the competing *contextual relevance* hypothesis. Thus, stressing the differences between the groups, we expect differences in the association of social isolation and loneliness between host, migrant, and refugee population to be of substantive size. In detail, we expect the maximum difference between the associations to be above a threshold of 0.2 standard deviations (for a more detailed discussion of the choice of this value, see Supplementary Material (SM) 4 in the supplemental material).

Expanding on the contextual relevance hypothesis, we propose four hypotheses that make competing predictions about the differences in the association between social isolation and loneliness.

H_{2a}: *The increased need hypothesis* – The post-migration phase requires new skills and knowledge to fully participate in society. Social networks are an important structure, and have the potential to aid integration of migrants (Gërxhani & Kosyakova, 2020) and refugees (S. Y. Cheung & Phillimore, 2013; Månsson & Delander, 2017). Given the peculiarity of the flight experience, refugees tend to suffer even stronger resource losses, including income and property loss, expenses of the flight, physical and mental strain during migration as well as loss of social contact and trust in neighbors, colleagues, and family (Porter & Haslam, 2005; Ryan, Dooley, & Benson, 2008; Schweitzer, Melville, Steel, & Lacherez, 2006; Steel, Silove, Phan, & Auman, 2002). Given the higher demand for social inclusion and support among refugees due to resource loss, the consequences of objective social isolation should weigh more strongly in perception on refugees. We hence expect the association of social isolation with loneliness to be strongest among refugees, and weaker for other migrants. It is supposedly weakest for the host population who on average have the lowest need to substitute resources.

H₂b: *The flight exceptionalism hypothesis* – Alternatively to **H₂a** but in a similar line of argument, it can be hypothesized that the differences between the three groups is not gradual in nature, but categorical. Refugees face a more difficult situation in the host country regarding social, cultural, and legal integration. The involuntary disruption of social networks is fundamentally different from that of other migrants and the host population. This unnatural break from social resources sets refugees apart with respect to their vulnerability and hence a need to receive support. Violence of the past remains visible in the aftermath of refugee migration, for instance manifesting in post-traumatic stress disorder (Schweitzer et al., 2006; Silove, Sinnerbrink, Field, Manicavasgar, & Steel, 1997). Moreover, refugees experience involuntary family separations, entailing fear of family members remaining in danger (Choummanivong, Poole, & Cooper, 2014; Hutchinson & Dorsett, 2012; Löbel, 2020; Nickerson, Bryant, Steel, Silove, & Brooks, 2010; Savic, Chur-Hansen, Mahmood, & Moore, 2013). Finally, refugee housing further isolates the newcomers from the host population and other migrants, with an effect on refugee mental health (Walther et al., 2020). A functioning social network, in quantity but also in quality support, is valuable in this context specific strain (Berkman, Glass, Brissette, & Seeman, 2000; Thoits, 2011). The lack of social resources under these excluding circumstances might lead to an increased emotional response to the externally induced social isolation. Hence, we expect the association between social isolation and loneliness to be strongest for refugees, with no systematic differences between host and migrant population.

H₂c: *The numbing hypothesis* – This hypothesis makes the opposite prediction to **H₂b**. It is based on the insight that refugees have a higher risk of suffering from Post-Traumatic Stress Disorder (PTSD) and depression due to the extreme circumstances amid their resettlement (Fazel, Wheeler, & Danesh, 2005). Psychological responses to trauma can include a series of bodily reactions such as depersonalization and derealization symptoms (Sierra & David, 2011). One of them, involuntary in nature, is emotional numbing (Fazel et al., 2005; Spahic-Mihajlovic, Crayton, & Neafsey, 2005). Numbing is a diminished affective responsiveness towards any kind of feelings one might have in an emotional situation, also

connected to emotion suppression (Tibubos et al., 2018). We hypothesize that numbing also affects the reaction of refugees towards experiences of social isolation. In the refugee situation, numbing means the dampening of their perception of loneliness. We therefore expect a lesser association between social isolation and loneliness among refugees compared to the host and migrant population.

H2d: *The anticipation hypothesis* – No matter whether consulting economic theory (Aksoy & Poutvaara, 2019; Borjas, Bronars, & Trejo, 1992; Borjas, Kauppinen, & Poutvaara, 2019; Mckenzie & Rapoport, 2006), health research (Rubalcava, Teruel, Thomas, & Goldman, 2008; Silventoinen et al., 2007), or insights on social networks (Batista, McIndoe-Calder, & Vicente, 2017; Blumenstock, Chi, & Tan, 2019; Boyd, 1989; Mckenzie & Rapoport, 2006), it appears that migrants and refugees moving to another country systematically differ from those they leave behind. Though not fully conclusive, previous studies show that migrants are healthier and more socially connected than the average person in their country of origin – an indicator for self-selection. They actively consider the opportunities and opportunity costs. For refugees, the trade-off is even stronger due to the nature of the migration process. Both groups might more readily come to terms with insufficient networks for the time being. Based on these assumptions about anticipation of reduced social connections in the post-migration phase, the last hypothesis postulates that migrants show a lower association between social isolation and loneliness than the host population. We expect refugees to show the weakest association of the three groups.

Table 1: Hypotheses on different degrees of vulnerability to social isolation with respect to loneliness.

Hypothesis	Theory	Proposal		
H_1 – contextual relevance	Context moderation	Substantive differences in the way social isolation correlates with loneliness across host, migrant, and refugee population $$\max(|\beta_h - \beta_m|,|\beta_h - \beta_r|,|\beta_r - \beta_m|) > t$$ $$t = 0.2\ SD$$		
			Ranking	Prior Probability[c]
H_{2a} – increased need	Varying need for networks and support: hence elevated vulnerability according to migration experience	Host population is hypothesized to experience the least, refugee population the most vulnerability	$\beta_h < \beta_m < \beta_r$	$\frac{1}{6}$
H_{2b} – refugee exceptionalism	Exceptional vulnerability due to exceptional strain among refugees	Refugees are exceptionally vulnerable to social isolation, but there are no systematic differences between host and migrant population	$\{\beta_h, \beta_m\} < \beta_r$	$\frac{2}{6}$
H_{2c} – numbing	Trauma resulting in emotional unresponsiveness	Lesser association between social isolation and loneliness experienced by refugees compared to the host and migrant population	$\{\beta_h, \beta_m\} > \beta_r$	$\frac{2}{6}$
H_{2d} – anticipation	Self-selection into migration yields lower susceptibility	Refugees experience the least susceptibility to social isolation, migrants less than host population	$\beta_h > \beta_m > \beta_r$	$\frac{1}{6}$
H_3 – No systematic ordering		No systematic ordering	$\{\beta_h, \beta_m, \beta_r\}$	1

[a] The β indicates the association between social isolation and loneliness. Population groups are defined in the index: h= host, m= migrant, r= refugee.

[b] H_3: 'no systematic difference', in contrast to conventional hypothesis terminology in frequentist statistics. We believe that the association will never be exactly equal. Therefore, we also establish hypothesis H_3 instead of H_0.

[c] See methods section and supplemental material for a derivation of the prior probabilities

3. Methods

3.1 Data

We use 2016 and 2017 data of the SOEP v.35 (Goebel et al., 2018; Liebig et al., 2019)[13]. The survey is a stratified random sample of the German population with recent booster samples for migrants and refugees. Notably, the IAB-BAMF-SOEP refugee-survey is harmonized with other samples and allows for analysis of a large number of cases of recently arrived refugees to Germany between 2013 and 2016. The SOEP draws the refugee samples from the Central Registry of Foreigners. Hence, the refugee survey is a sample from a clearly defined population. This is a clear advantage as most refugee surveys are based on highly targeted, clinical, or convenience samples (Kroh, Kühne, Jacobsen, Siegert, & Siegers, 2017; Kühne, Jacobsen, & Kroh, 2019).

3.2 Measures

Migrant status – We group individuals into (1) Germans without a direct migration background and German second generation migrants[14] - labelled host population (**H**), (2) those with direct migration background – migrants (**M**) and (3) those with refugee or similar protected status who arrived since 2013 as part of the IAB-BAMF-SOEP Survey – refugees (**R**).

Loneliness – We use the three-item version of the UCLA loneliness scale (Hughes, Waite, Hawkley, & Cacioppo, 2004) as our measure for subjective loneliness. Items are rated on 5-point scales (0=„never", 1=„rarely", 2=„sometimes", 3=„often", 4=„very often"). Based on this scale, we test two different outcome measures of loneliness: (1) a simple summary score and (2) the factor score from a confirmatory factor analysis of the three items. Migrants and host population were surveyed on the three

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[13] DOI: 10.5684/soep-core.v35
[14] We define the group of German host population as those born in the Federal Republic of Germany as of 1949, including second generation migrants.

items in 2017, refugees in 2016, leading us to transmit the 2016 information to 2017. Measurement invariance tests across groups can be found in SM 1.

Social isolation – We base the construction of social isolation on the seminal work on the need to belong by Baumeister & Leary (1995). The authors set out two principles for the sense of belonging that guide our definition of social isolation. First, the principle of *satiation* refers to the need for a minimum level of social connectedness to be present. This means that individuals evaluate themselves as lonely primarily if a certain degree of social connectedness is not present. It implies a threshold effect of social connectedness on loneliness. From this principle we derive relevance of analyzing social isolation, as a categorical concept, instead of degrees of social connectedness. Second, the *substitution* principle refers to the idea that certain social connections can replace others, hence shielding from isolation to a certain extend. This is reflected in the composition of this variable.

Social connections can cover different dimensions of social life, for example family and household, social activities, or social support (Cornwell & Waite, 2009). If an individual lacks these social linkages within a certain dimension, we will define the individual as being *deprived* in this particular social dimension in contrast to being *integrated*. If individuals are deprived in several dimensions, thereby not satisfying the *satiation* criterion, we will consider them to be overall socially isolated.

Concretely, we measure social isolation across three domains consisting of several indicators (Cornwell & Waite, 2009):

1) the size of the support network (SS) as surveyed by means of the number of individuals named in a name generator on social support in three categories. The SOEP contains the social support items (SS) for refugees in 2017 and for the host population and other migrants in 2016. Hence, we transmit the 2016 information for SOEP participants to 2017.

2) living and partnership arrangements (LA) a) having a spouse and b) presence of other household members.

3) frequency of attending social activities (SA) a) church, b) cultural activities, c) cinema/disco, d) sports, e) arts.

As there are different reasonable thresholds, which can be used to define social isolation across the different social domains, we create different variants of our indicator. These cut offs vary across the degree of substitution that can be integrated within a dimension. For instance, we identify a deprivation in the dimension of social support networks first, when someone has named no one as social support provider. In a second variation, we consider someone as deprived who only names 1 person per dimension. Variation one allows full substitutability, the other one partial substitutability. Moreover, we assume the absence of substitution theoretical implausible as it would lead to empirical extremely high levels of social isolation.

For each indicator and domain as well as the final addition of domains we test two alternative cut offs: one that allows for more and another allowing for less substitution. Overall, we derive 16 different social isolation indicators based on both principles (Figure 1, for a formal definition of the coding, see SM 3 in the supplemental material).

Controls - We control for age groups and gender. We further vary our models across specification in our multiverse analysis to allow for different combinations of controls variables including education, residence in rural and urban areas and East/ West Germany. For an overview of the coding of control variables, consult SM2.

Figure 1: Coding scheme for social isolation

SS	LA	SA
Items	*Items*	*Items*
Emotional Instrumental Appraisal	Partner Other HH members	Church Sports Arts Cinema/club Cultural activities
0 = no support 1 = min 1 person	0 = not present 1 = min 1 person	0 = < monthly 1 = monthly +

$s_{SS}=1$: $\geq 1 = 1$ $s_{SS}=0$: $\geq 2 = 1$	$s_{LA}=1$: $\geq 1 = 1$ $s_{LA}=0$: $\geq 2 = 1$	$s_{SA}=1$: $\geq 1 = 1$ $s_{SA}=0$: $\geq 3 = 1$

SS	LA	SA
0 = deprived 1 = integrated	0 = deprived 1 = integrated	0 = deprived 1 = integrated

$s_{SI}=1$: $\leq 0 = 1$
$s_{SI}=0$: $\leq 1 = 1$

Social isolation

0 = not isolated
1 = isolated

Note: The numbers 0 and 1 in the summary stages of indicators refer to s = 1: full substitutability. s = 0: partial substitutability. They are also part of Figure 2 below to signal the combinations of partial and full substitution. SS= social support, LA= living and partnership arrangements, SA= social activities, HH= household.

3.3 A multiverse framework – reporting different data and model specifications

Recent research proposes that studies based on secondary data analysis report all plausible specifications of their data coding and sample definitions (Simonsohn et al., 2019; Steegen et al., 2016). It reduces the probability of reporting findings, specific to certain idiosyncratic decisions in the process of the data analysis (Orben, Dienlin, & Przybylski, 2019; Rohrer, Egloff, & Schmukle, 2017). Based on the definition of social isolation and the different cut offs presented additionally to alterations in sample definition and coding, we report all plausible specifications in a multiverse framework (specifications are listed in Figure S6). See SM 5 and SM 6 in the supplemental material for detailed description of the approach.

3.4 Definition of the statistical model

This paper comprises five competing hypotheses, postulating different associations between the groups of host (H), migrant (M) and refugee (R) population living in Germany in terms of their objective social isolation and loneliness. The central parameters that represent the quantities of interest from our hypotheses are the regression coefficients β. They estimate the association of social isolation (SI) and loneliness (LONE) for the host population, migrants, and refugees separately, conditional on a set of control variables (X).

$$LONE_{gsdi} = \beta_{gsd}SI_{gsdi} + \gamma_{gs}X_{gsdi} + u_{gsd} + \epsilon_{gsdi}, \tag{1}$$

$$g \in \{H, M, R\}, s \in \{S\}, d \in \{D\}, u_{gsd} \sim N\left(0, \delta_{u_{gs}}\right), \epsilon_{gsdi} \sim N\left(0, \delta_{\epsilon_{gs}}\right), \beta_{gsd} \sim N\left(\beta_{gs}, \delta_{\beta_{gs}}\right)$$

The index g stands for the three groups with different migrant status while the index s stands for the different specifications that are chosen with $S = \{s_1, s_2, \dots, s_k\}$ being the set of all $k = 1887$ converged specifications reported in our study (for a graphical representation of all results per group, consult Appendix Figures S4-6). Index i stands for the individual. SI_{gsd} is the social isolation indicator. β_{gsd} is the parameter of interest that we will compare across the three groups to evaluate the five hypotheses. X_{gsd} is a matrix of control variables, and γ_{gsd} is the corresponding vector of coefficients.

One index needs to be mentioned separately: d indexes age and gender specific groups. The model is therefore a multilevel model. Individuals nest within 24 gender specific age groups and u_d is the random effect for each group with standard deviation $\delta_{u_{gs}}$. ϵ_{gsdi} is the individual specific error-term with standard deviation δ_ϵ. We therefore allow the association of social isolation with loneliness to vary across gender specific age groups. This is important as in a second step the estimates of the migrant and refugee group are post-stratified and averaged, with the same distribution across gender specific age groups as the host population. The post-stratification procedure accounts for the possibility that differences in the association found in the data could be attributed to the strong differences in age and gender composition of the three samples. Therefore, the hypotheses are evaluated based on these post-stratified parameters from the aforementioned multilevel regression models:

$$\bar{\beta}_{gs} = \frac{\sum_{d=1}^{24} \beta_{gsd} w_{d_H}}{w_{d_H}} \tag{2}$$

w_d is the number of observations in each of the gender-specific age groups in the host population.

3.5 Evaluation framework: Bayesian Evaluation of Informative Hypotheses (BEIH)

The BEIH framework is designed for a comparative evaluation of competing hypotheses. It is based on a Bayesian approach to statistical modeling and differs in certain respects from the common frequentist approach (Fennessey, 1977; Gelman, Carlin, Stern, & Rubin, 2014). The general estimation procedure for the posterior distribution of the parameters we use is the Integrated Nested Laplace Approximation (INLA) (Martins, Simpson, Lindgren, & Rue, 2013; Rue, Martino, & Chopin, 2009) implemented as a package for R (www.r-inla.org).

Our hypotheses imply a ranking of the association strength of the central parameters $\bar{\beta}_{gs}$. In a Bayesian framework we can estimate the probability that such a ranking - and by extension the proposed hypothesis - is supported by model and data. We therefore get $p(H_t|s(Y))$ where s indexes the specification of the data Y and the model as noted above.

The key feature of the BEIH method is to compare the *observed* support $p(H_t|s(Y))$ for the hypothesis from the estimated posterior distribution of the coefficients to the *expected* support $p(H_t)$ for the hypothesis (prior probability). The prior probability is calculated assuming random ordering of the coefficients (Hoijtink, Klugkist, & Boelen, 2008; van de Schoot et al., 2013). From the relation of the two probabilities, we get the Bayes factor:

$$BF_{ts} = \frac{p(H_{th}|s(Y))}{p(H_t)} \tag{3}$$

If the Bayes factor is larger than 1, the hypothesis formulated has more predictive power than given by chance. Otherwise, if the Bayes factor is smaller than 1, the hypothesis is less probable than by chance. As we test more than two hypotheses against one another, we additionally calculate posterior model probabilities (PMP):

$$PMP(\boldsymbol{H_t}) = \frac{BF_t}{\sum_{t=1}^{2d} BF_t}; t \in 2a, 2b, 2c, 2d \tag{4}$$

The PMP states how much support one hypothesis receives compared to the overall support that all hypotheses under investigation receive. The range of the PMP is from 0 to 100%. The higher the value, the stronger the support for the hypothesis in question compared to the competing hypotheses (van de Schoot et al., 2013).

4. Results

The working sample for analysis consists of N=16,658 members of the host population, N=3,790 migrants of the first generation as well as N=4,723 refugees in Germany.

4.1 Descriptive statistics

Descriptive statistics of loneliness are provided in Table 2. The factor score of loneliness is smallest for the host population (M=-0.17, SD=0.85), and larger for migrants (M=-0.03, SD=0.97) and refugees (M=0.55, SD=1.24). The magnitude of the differences is even more intuitive when observing the summary score between the groups, ranging from a M=2.88 (SD=2.22) in the host population to a M=4.81 (SD=3.23) for refugees. The dispersion is larger in the refugee population compared to the host population and migrants. SM 2 and 3 lays out further descriptive statistics.

Table 2: Descriptive statistics of the two dependent variables of interest, a factor score of loneliness and the sum score – by subgroup

	Hosts				Migrants				Refugees			
	M	SD	Min	Max	M	SD	Min	Max	M	SD	Min	Max
Factor score	-0.17	0.85	-1.28	3.33	0.04	0.97	-1.28	3.33	0.57	1.24	-1.28	3.33
Summary score	2.88	2.22	0.00	12.00	3.42	2.53	0.00	12.00	4.81	3.23	0.00	12.00

Notably, the prevalence of social isolation depends on the choice of cut-off points (Figure 1). The less we allow for substitution among and between dimensions, the more people count as socially isolated. Under full substitution (coding 1111), less than 1% of the sample are categorized as socially isolated. When only partial substitution is allowed (coding 0000), social isolation becomes as high as 30% among the group of refugees, and 15% for host population and migrants. Disallowing full substitutability in the domain of social activities most strongly increases the prevalence of social isolation. Overall, refugees are more socially isolated than migrants and the host population. Host population and migrants do not differ greatly regarding the prevalence of social isolation.

Figure 2: Prevalence of social isolation by migration status over different coding specifications of social isolation.
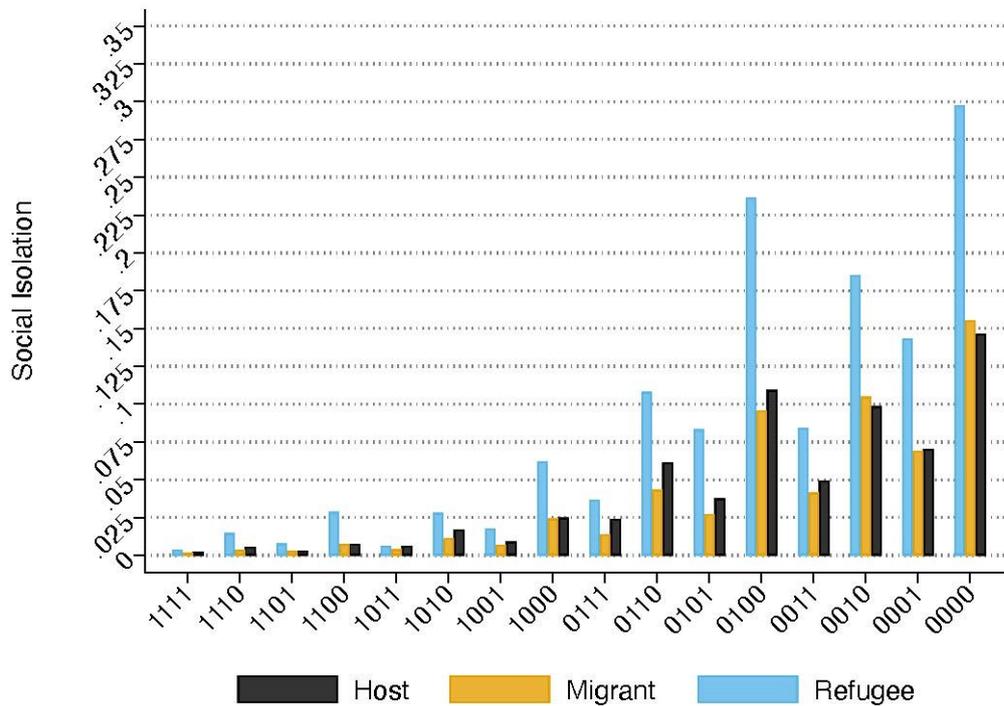
Note: 4 numbers per isolation on the X-axis describe the degree of substitution (s) allowed in each step of the generation of the indicator for social isolation (see equation 1 and 2). The first digit represents the coding for the degree of substitution across dimensions (s_{SI}). The second digit indicates substitutability within the social support (s_{SS}) dimension. The third digit indicates substitutability within the living and partnership arrangements (s_{LA}) dimension. The fourth digit indicates substitutability within the social activities (s_{SA}) dimension. A s=1 stands for full substitutability, a s=0 for partial substitutability.

4.2 Testing the hypotheses

Results from the BEIH analysis are presented in Figure 2, containing two sets of results over the 16 codings of social isolation on the Y-axis in terms of SD. On the left, the posterior mean and 95%-credible interval of the regression coefficients of social isolation are plotted (averaged across specifications in Figures S8-9 – for a list with detailed posterior means and credible intervals consult Table S8 in SM8). On the right, the table reports the BF and PMP. The darker the box, the higher the PMP for the hypotheses corresponding to the coding of social isolation. We also would like to note the lowest absolute number of observations counted as socially isolated in some of the codings. They naturally lead to a smaller number of cases per cell in the analysis, in some cases with fewer than 50 observations per cell, marked in grey. We consider codings with fewer than 50 cases as unreliable for

interpretation and focus on the results from models with sufficient cases of social isolation in all three groups.

Regardless of the coding of social isolation, we see a substantial association of social isolation with loneliness in all three groups (Figure 2, SM Table S8). Still, the posterior mean of the migrant population is persistently lower than that of the host population and that of refugees. It ranges between 0.149 [SI Coding: 0010, 95%-CI: 0.017;0.271] and 0.298 [SI Coding: 1000, 95%-CI 0.014;0.558]. The posterior means of hosts and refugees are larger and similar in size, with an effect size of 0.50 SD and ranging from 0.376 [SI Coding: 0000, 95%-CI: 0.315;0.442] to 0.655 [SI Coding: 0101, 95%-CI: 0.548;0.772] for the host population and for refugees from 0.403 [SI Coding: 0000, 95%-CI: 0.271;0.546] to 0.668 [SI Coding: 0110, 95%-CI: 0.452;0.888]. This means being socially isolated is associated with about a 0.20 SD higher loneliness score for migrants and about a 0.50 SD higher score of loneliness for the host population and refugees in Germany. These comparisons are always made with respect to those individuals who are not socially isolated within their respective group.

The first column from the left of the table in Figure 2 reflects the evaluation of hypothesis H_1. It reports the probability of the maximum difference between the three groups in effect size being above the threshold of 0.20 SD (Luhmann & Hawkley, 2016). We can see that, with sufficient observations for social isolation, the probability of the absolute differences being substantial is high. It is above 69% in all codings and in many codings above 90%. Our data and model therefore yield strong support for the contextual relevance hypothesis H1.

Figure 2 also shows the BF from the evaluation of the competing hypotheses H2a-d. The PMP for hypothesis H2b (refugee exceptionalism) is largest compared to the other four hypotheses, as indicated by the darker green background of the BFs. The BF, however, remains below 1 in three of the codings with sufficient variation on the independent variable of interest. Hence, despite being favored relative to other hypotheses, it is less supported by our data than would be expected by chance alone, which is a poor absolute performance.

In the other cases, H_{2b} receives the highest BF, with 2.89 times more support for the hypothesis than expected by chance in the SI Coding: 0110 (Figure 2). Hence, we find most support for the hypothesis that the association between social isolation and loneliness is larger for refugees than for the host population and migrants. $H2_b$, the increased need hypothesis, comes closest to the data pattern.

This result of the evaluation is at odds with the observations of posterior means and the group level credible intervals. A focus on this output shows that the association between social isolation and loneliness is lower for migrants and about equal for refugees and the host population across different social isolation codings. This phenomenon is an indication that we yet have not correctly identified the most suitable hypothesis given the data.

Figure 3: Regression results and relative support for the hypotheses.

Legend: ■ host   ● migrant   ◀ refugee

Coding of social isolation	p(H1)	BF: H2a	H2b	H2c	H2d
1111	0.94	0.96	1.50	0.50	0.41
1110	0.96	1.53	2.59	0.06	0.04
1101	0.91	1.10	0.89	0.76	0.32
1100	0.93	2.26	2.67	0.03	0.02
1011	0.94	0.10	0.46	1.25	1.90
1010	0.90	0.40	2.21	0.11	0.15
1001	0.82	0.17	0.28	1.97	1.75
1000	0.72	0.53	2.22	0.14	0.17
0111	0.76	0.45	1.82	0.32	0.43
0110	0.97	0.05	2.87	0.00	0.00
0101	0.90	0.01	0.63	0.14	0.26
0100	0.79	0.01	2.34	0.01	0.02
0011	0.69	0.03	0.66	0.42	0.79
0010	0.86	0.00	1.62	0.02	0.03
0001	0.75	0.00	0.82	0.12	0.24
0000	0.76	0.00	1.91	0.01	0.02

Note: The X-axis refers to effect sizes while the Y-axis describes different choices of specification of social isolation. 4 numbers per isolation indicator describe the degree of substitution (s) allowed in each step of the generation of the indicator for social isolation. The first digit represents the coding for the degree of substitution across dimensions (s_{SI}). The second digit indicates substitutability within the social support (s_{SS}) dimension. The third digit indicates substitutability within the living and partnership arrangements (s_{LA}) dimension. The fourth digit indicates substitutability within the social activities (s_{SA}) dimension. A s=1 stands for full substitutability, a s=0 for partial substitutability. Results which are underlined in grey are based on cell sizes for social isolation of less than 50. Bayes Factors are provided by the numbers in the table on the right. The strength of the Posterior Model probability is indicated by underlying green color in the table. The darker the green, the stronger relative support for specific hypotheses.

5. Discussion

We hypothesized migration status shaping the susceptibility to social isolation. Among the set of hypotheses, we saw that the "refugee exceptionalism" hypothesis H_{2b} received most support relative to the other hypotheses in the data. The finding that the association between social isolation and loneliness is, overall, weaker for migrants than for the host and refugee groups conflicts with the results of our formal procedure for testing hypotheses. This contradiction indicates that the set of hypotheses did not include the most relevant proposition about the relative strength of association between social isolation and loneliness. The hypothesis that migrants do indeed show a lesser susceptibility to social isolation should be tested in future studies on independent samples.

Looking for an explanation for this finding, we turn to the composition of the migrant group and to alternative hypotheses we equally postulated. The weaker association between social isolation and loneliness for migrants can be attributed to positive self-selection and anticipation (H_{2d}). Migrants might more readily accept their social circumstances, as they actively chose their destination based on social network considerations (Boyd, 1989). Meanwhile, refugees have less choice of destination. Their self-selection to migrate is less linked to a well-functioning diaspora than to a need to survive.

One puzzle is the similar pattern of susceptibility to social isolation among refugees and the host population. Deviations from social norms are perhaps more awkward for individuals from the host population, who compare themselves to members of the host community whom they should ostensibly resemble (J. T. Cacioppo & Patrick, 2008). Meanwhile, a migrant in the same age group is aware of his or her situation and can evaluate it in a positive light. This sensitivity to social deviation from the norm in the host population would then be equal in strength compared to the susceptibility previously postulated for the refugee population.

Overall, refugees show the highest exposure to social isolation and loneliness. Given that they also have a high susceptibility to social isolation, they can be regarded as the most vulnerable group in this analysis, leaving aside their capacity to respond to the exposure (Diderichsen et al., 2019).

One limitation of our analysis is that data did not allow us to test the underlying mechanisms directly. This also makes it difficult to assess why the data showed a clear but unexpected result in migrants being less susceptible to social isolation. Further research needs to examine the proposed mechanisms separately. We assume the external validity of results, as the prevailing mechanisms should not differ by country. However, the refugee policies of host countries can influence self-selection, for instance through visa sponsorship. Despite the large data set used, a more precise differentiation within the migrant and refugee group is not implemented. It is possible that country of origin, reason for migration, or duration of stay explain how social isolation are linked to loneliness in varying degrees. Last, we argued that social isolation is deprivation in social contacts across domains. While our data cover three domains and several indicators, there are aspects we do not measure, for example, closeness of the social network or integration into transnational networks (Bilecen & Cardona, 2018). More specific data would be necessary for the last two considerations to be further explored.

As established in previous research, loneliness is particularly strongly linked to negative mental health outcomes. This cost to individuals and society should be avoided where possible (Beutel et al., 2017; Holt-Lunstad, 2017). Our study suggests that interventions to lessen the risks of mental ill-health can start with the prevention of social isolation. The groups at stake might be best stimulated in different ways in terms of environmental prevention. Nevertheless, the present analysis cannot infer direct policy guidance. Particularly interesting would be a closer examination of whether a substitution effect among different social activities exists. This is just one way forward in studying the association between social isolation and loneliness in the context of migration.

6. References

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7. Appendix

SM 1 - Loneliness – Measurement Invariance

We ran measurement invariance analyses over the three groups of analyses in our study. Overall model fit is very good (based on CFI > 0.85 and RMSEA below < 0.1 criterion) in all three groups (Table S1a, for measurement quality adjusted cut-offs, see (McNeish, An, & Hancock, 2018)). The model used is represented in figure S1. Comparing different models based on subsequently stronger restrictions, we can see that scalar measurement invariance holds across sex, age, and migration status (based on the *ΔCFI* and *ΔRMSEA* < 0.01 criterion (G. W. Cheung & Rensvold, 2002; Putnick & Bornstein, 2016)). This means that both the association of social isolation and loneliness as well as the levels of loneliness can be meaningfully compared across the three migration groups. The difference we find are therefore unlikely to derive from substantial differences in the way the three-item loneliness scale works in the three groups.

Table S1a: Loneliness overall model fit by migration status

	χ^2	df	p	CFI	RMSEA	RMSEA-LB	RMSEA-UB	SRMR
				Loneliness				
Overall	60.643	1.000	0.000	0.998	0.049	0.039	0.059	0.014
Migration status								
Host population	153.237	1.000	0.000	0.990	0.096	0.083	0.109	0.026
Migrant	29.033	1.000	0.000	0.992	0.086	0.061	0.114	0.024
Refugee	19.439	1.000	0.000	0.995	0.062	0.040	0.088	0.017

Table S1b: Loneliness factor loadings by migration status

	LONE-1	LONE-2	LONE-3
Overall	0.647	0.822	0.796
Migration status			
Host population	0.633	0.796	0.791
Migrant	0.640	0.825	0.787
Refugee	0.584	0.822	0.792

Table S1c: LONE item intercepts by migration status

	LONE-1	LONE-2	LONE-3
Overall	1.373	1.120	0.744
Migration status			
Host population	1.288	1.006	0.591
Migrant	1.457	1.142	0.821
Refugee	2.002	1.475	1.332

Table S2: Test for measurement invariance of the loneliness across sex and migration status

Loneliness	χ^2	df	p	CFI	RMSEA	RMSEA-LB	RMSEA-UB	SRMR	$\Delta\chi^2$	Δdf	ΔCFI	$\Delta RMSEA$
Sex												
configural	58.834	2.000	0.000	0.998	0.047	0.036	0.060	0.013	NA	NA	NA	NA
metric	62.894	3.000	0.000	0.998	0.040	0.030	0.050	0.015	4.060	1.000	0.000	-0.008
scalar	97.942	4.000	0.000	0.996	0.043	0.035	0.051	0.018	35.049	1.000	0.001	0.003
strict	111.969	5.000	0.000	0.996	0.041	0.034	0.048	0.018	14.027	1.000	0.001	-0.002
Migration status												
configural	201.708	3.000	0.000	0.991	0.089	0.078	0.100	0.024	NA	NA	NA	NA
metric	301.836	5.000	0.000	0.987	0.084	0.075	0.093	0.038	100.128	2.000	0.004	-0.005
scalar	484.551	7.000	0.000	0.979	0.090	0.083	0.097	0.045	182.715	2.000	0.008	0.006
strict	925.451	9.000	0.000	0.959	0.110	0.104	0.116	0.051	440.901	2.000	0.020	0.020
Age categories												
configural	137.446	12.000	0.000	0.995	0.069	0.058	0.082	0.015	NA	NA	NA	NA
metric	244.748	23.000	0.000	0.991	0.067	0.058	0.076	0.034	107.302	11.000	0.004	-0.003
scalar	298.632	34.000	0.000	0.989	0.060	0.053	0.067	0.037	53.884	11.000	0.002	-0.007
strict	382.531	45.000	0.000	0.986	0.059	0.053	0.065	0.039	83.899	11.000	0.003	-0.001

[a] df = degrees of freedom; CFI = comparative fit index; $RMSEA$ = root mean square error of approximation; LB = lower bound; UB = upper bound. BRCS= Brief Resilience Coping Scale. n/a = not applicable.

Figure S1: Loneliness (LONE) questionnaires used in the SOEP

321 **How often do you feel that you miss the company of others?**

LONE-1

Very often	1
Often	2
Sometimes	3
Occasionally	4
Never	5
No details	99

321:pgefl1	bgp	bgpr321	Company of Others is missing
321:pgefl1	bgp_refugees	bgpr321	Company of Others is missing
321:pgefl1	pl	plj0587	Company of Others is missing

322 **How often do you feel like an outsider?**

LONE-2

Very often	1
Often	2
Sometimes	3
Occasionally	4
Never	5
No details	99

322:pgefl2	bgp	bgpr322	Feeling Left Out
322:pgefl2	bgp_refugees	bgpr322	Feeling Left Out
322:pgefl2	pl	plj0588	Feeling Left Out

323 **How often do you feel socially isolated?**

LONE-3

Very often	1
Often	2
Sometimes	3
Occasionally	4
Never	5
No details	99

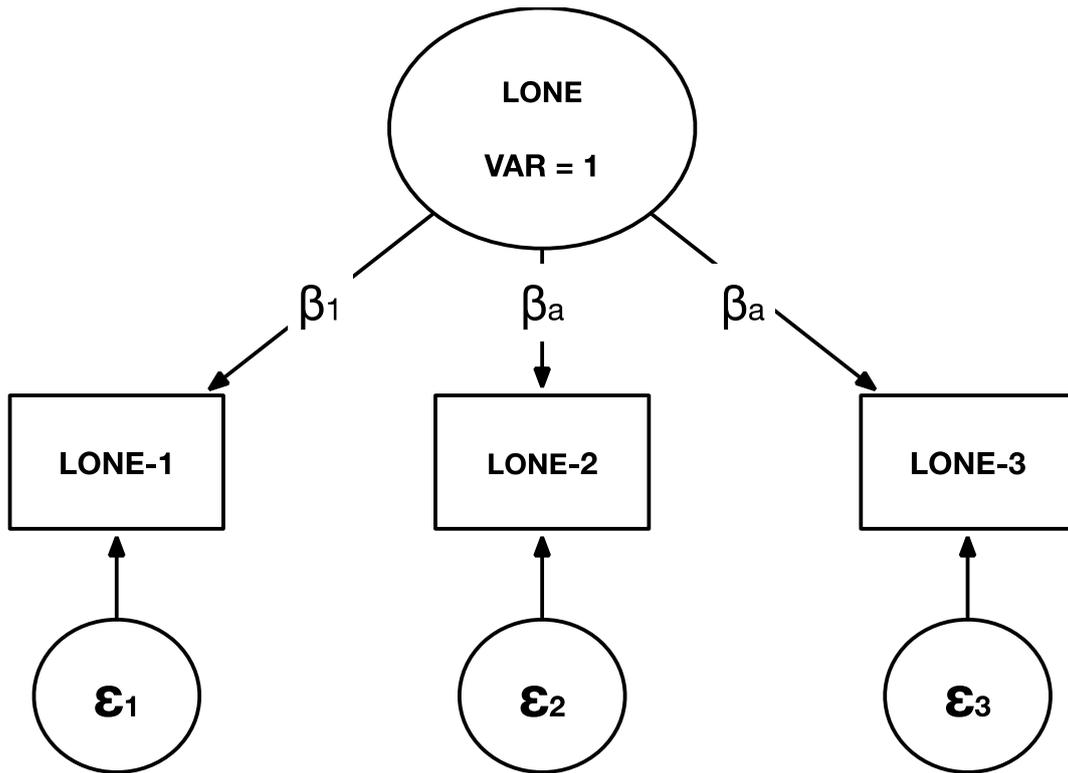|			
323:pgefl3	bgp	bgpr323	Feeling Socially Isolated
323:pgefl3	bgp_refugees	bgpr323	Feeling Socially Isolated
323:pgefl3	pl	plj0589	Feeling Socially Isolated

Figure S2: Factor structure for Loneliness (LONE). Refer to Figure S1 for item formulation in the survey and to Table S2 for summary statistics of the items

SM 2 - Coding decisions – general overview

In the following, we present the coding of all variables used in the analysis, adding to the replication of this study.

Table S3: Variable Coding Scheme and Survey Years

Variable	Coding Information	Survey Year
Independent Variables		
Network size – for emotional support	Count of the number of people with whom to discuss thoughts; Missing values in refugee population counted as 0 (not having a person).	2016 for host and migration population / 2017 for refugees of the IAB-BAMF-SOEP Survey of Refugees
	This variable consists of five individual variables asking for the role relation providing emotional support. Each variable is re-coded as dummy – indicating whether a role relation was named.	
	Afterwards, the information is consolidated to one variable, indicating whether any emotional support is subjectively granted.	
	0 = no support 1 = support	
Network size – informational support	Count of the number of people with whom to discuss educational and work-related matters; Missing values in refugee population counted as 0.	2016 for host and migration population / 2017 for refugees of the IAB-BAMF-SOEP Survey of Refugees
	This variable consists of five individual variables asking for the role relation providing informational support. Each variable is re-coded as dummy – indicating whether a role relation was named.	
	Afterwards, the information is consolidated to one variable, indicating whether any informational support is subjectively granted.	
	0 = no support 1 = support	

Network size – unpleasant truths	Count of the number of people with whom to discuss unpleasant truths; Missing values in refugee population counted as 0. This variable consists of five individual variables asking for the role relation providing appraisal support. Each variable is re-coded as dummy – indicating whether a role relation was named. Afterwards, the information is consolidated to one variable, indicating whether any appraisal support is subjectively granted. 0 = no support 1 = support	2016 for host and migration population / 2017 for refugees of the IAB-BAMF-SOEP Survey of Refugees
Spouse	0 = no spouse or partner 1 = spouse or partner	2017
Living Alone	0 = living not alone 1 = living alone	2017
Social Participation	Five dummy variables indicating the regular participation in social activities: 0 = not active 1 = active Activities include church, cultural activities, cinema/disco, sports, arts	2017

Dependent Variable		
Loneliness 1	Summary score of three items UCSL loneliness scale, coded 1 = never / 5 = very often: Company of others is missing, Feeling left alone, Feeling socially isolated	2017/ 2016 for those first surveyed in the IAB-BAMF-SOEP Survey of Refugees in 2016 *plj0587* *plj0588* *plj0589*
Loneliness 2	Weighted sum score of three items UCSL loneliness scale (subtraction of score from mean and divided by standard deviation) (Hughes et al., 2004)	2017/ 2016 for those first surveyed in the IAB-BAMF-SOEP Survey of Refugees in 2016 *plj0587* *plj0588* *plj0589*

Controls		
Age-Categories	Survey year – birthyear Categorization: 1 = 18 - 24 years 2 = 25 - 29 years 3 = 30 - 34 years 4 = 35 – 39 years 5 = 40 – 44 years 6 = 45 – 49 years 7 = 50 – 54 years 8 = 55 – 59 years 9 = 60 – 64 years 10 = 65 – 69 years 11 = 70 – 74 years 12 = 75+ years	2017
Gender	0 = male 1 = female	2017
Education	CASMIN 1 = Inadequately Completed 2 = General Elementary School 3 = Basic Vocational Qualification 4 = Intermediate General Qualification 5 = Intermediate Vocational 6 = General Maturity Certificate 7 = Vocational Maturity Certificate 8 = Lower Tertiary Education 9 = Higher Tertiary Education	2017
Rural/ Urban divide (Population density)	Number of inhabitants - retrieved from BGSR classification of counties in Germany 1 = > 2000 2 = 2000 - 5000 3 = 5000 - 20000 4 = 20000 - 50000 5 = 50000 -100000 6 = 100000 - 500000 7 = 500000 +	2017

Migration status	Individuals identified and categorised based on the generated SOEP variable *migback* and by means of the refugee sample indicators[15]	2017
	1 = Native Germans – individuals with German nationality or residence status, who were born in Germany and whose parents were no migrants either (DESTATIS, 2020)[16]	
	2 = Migrants – in this case those with a direct migration background, meaning they were born outside of the German borders after 1949.	
	3 = Refugee status – individuals who applied for asylum between 2013 and 2016 (selection via sample M3, M4 and M5 of the IAB-BAMF-SOEP Survey of Refugees)	

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[15] For one sample specification, we do not select refugees via the IAB-BAMF-SOEP Survey (Refugees who applied for asylum in Germany between 2013 and 2016) but also those who applied earlier. Those individuals can be identified using the generated *arefback* variable in the SOEP.

[16] For one specification of the model, we include second-generation migrants to the group of native Germans.

Table S4: Overview of years of measurement for social isolation and loneliness

Group	Loneliness	Social isolation
Host	2017	2016
Migrant	2017	2016
Refugee	2016/2017	2017

Table S5: Sample restrictions

	Restriction	Individuals
1	Full sample	69 766
2	Exclude non-refugees, pre-2013 refugees, and German born refugees in refugee sample	67 996
3	Exclude new 2017-sample (PIAAC-L) without support variables	62 331
4	Exclude non-probability observations	45 398
5	Exclude individuals below 18	30 628
6	Exclude individuals with missing information on covariates	28 569
7	Exclude individuals with missing information on loneliness	25 171

Table S6: Country of origin by migration status

Country of origin	Host	Migrant	Refugee
Germany	16,658	0	0
Turkey	0	311	6
Poland	0	441	0
Romania	0	288	0
Syria	0	54	2,569
Russia	0	435	70
Afghanistan	0	21	569
Iraq	0	58	633
Ex-Yugoslavia	0	226	33
Southern Europe	0	464	48
Eastern Europe	0	386	11
CIS	0	484	43
Arabic	0	93	116
Latin America	0	62	1
Western Europe & NA	0	243	3
Africa	0	63	371
Asia	0	150	249
Rest	0	11	1
Observations	16658	3790	4723

Figure S3: Distribution of the year of immigration within migrant and refugee group
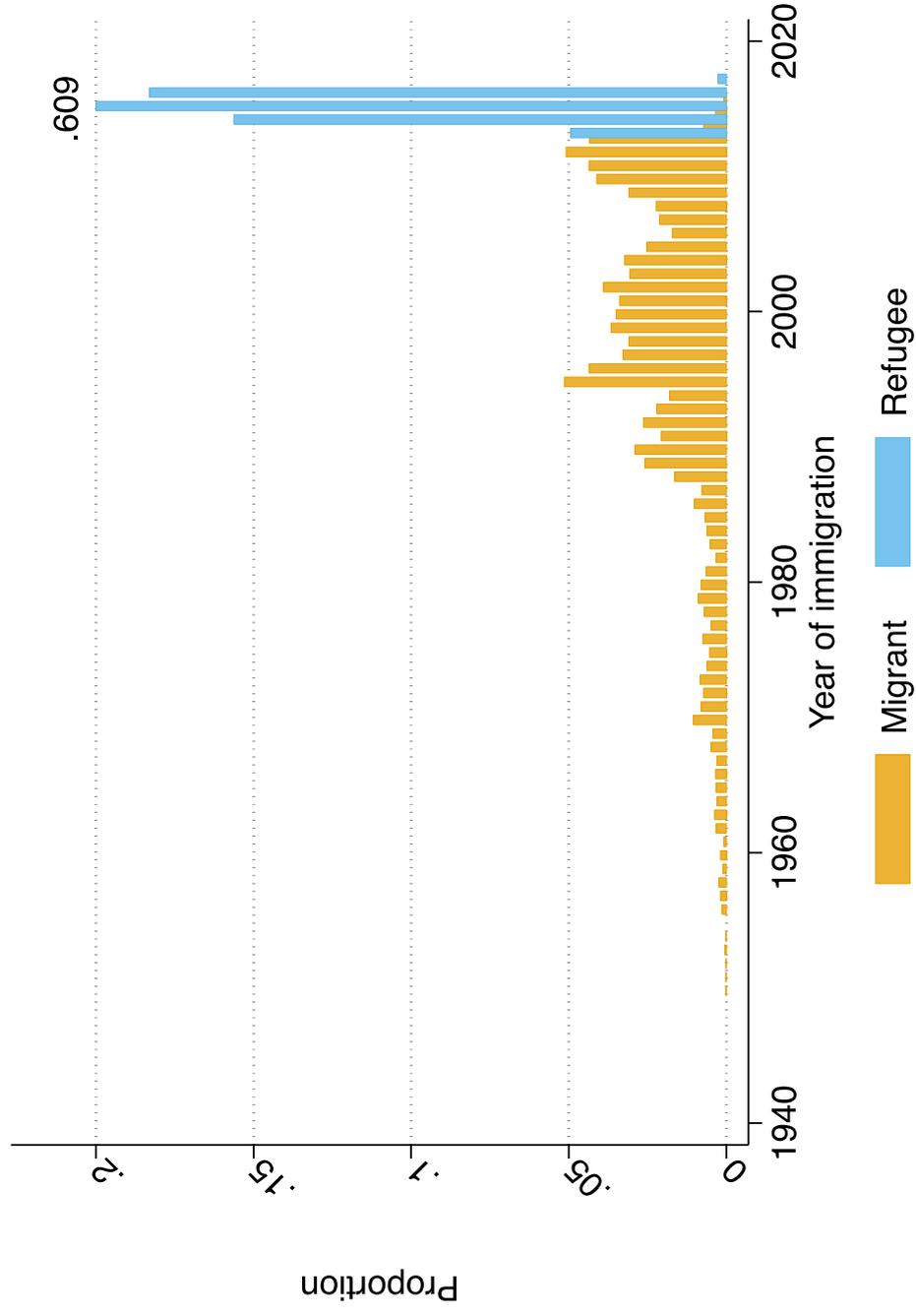
[a] Value of year 2015 for refugees (0.609) is cut off at 0.2 for illustrative purposes. It means that 60.9% of all refugees in the analytic sample arrived in Germany in 2015.

Table S7: Descriptive statistics - control variables

Migration status	Host				Migrant				Refugee			
	M	SD	Min	Max	M	SD	Min	Max	M	SD	Min	Max
Loneliness score (weighted)	-0.17	0.85	-1.28	3.33	0.04	0.97	-1.28	3.33	0.57	1.24	-1.28	3.33
Loneliness score (unweighted)	2.88	2.22	0.00	12.00	3.42	2.53	0.00	12.00	4.81	3.23	0.00	12.00
Gender (proportion of men)	0.46	0.50	0.00	1.00	0.45	0.50	0.00	1.00	0.61	0.49	0.00	1.00
Age	51.18	17.47	18.00	101.00	44.35	13.91	18.00	98.00	33.40	10.99	18.00	97.00
Social Isolation by coding												
1111	0.00	0.05	0.00	1.00	0.00	0.04	0.00	1.00	0.00	0.06	0.00	1.00
0111	0.02	0.15	0.00	1.00	0.01	0.12	0.00	1.00	0.04	0.19	0.00	1.00
1110	0.01	0.07	0.00	1.00	0.00	0.06	0.00	1.00	0.01	0.12	0.00	1.00
0110	0.06	0.24	0.00	1.00	0.04	0.20	0.00	1.00	0.11	0.31	0.00	1.00
1101	0.00	0.06	0.00	1.00	0.00	0.05	0.00	1.00	0.01	0.09	0.00	1.00
0101	0.04	0.19	0.00	1.00	0.03	0.16	0.00	1.00	0.08	0.28	0.00	1.00
1100	0.01	0.09	0.00	1.00	0.01	0.09	0.00	1.00	0.03	0.17	0.00	1.00
0100	0.11	0.31	0.00	1.00	0.10	0.29	0.00	1.00	0.24	0.42	0.00	1.00
1011	0.01	0.08	0.00	1.00	0.00	0.06	0.00	1.00	0.01	0.08	0.00	1.00
0011	0.05	0.22	0.00	1.00	0.04	0.20	0.00	1.00	0.08	0.28	0.00	1.00
1010	0.02	0.13	0.00	1.00	0.01	0.11	0.00	1.00	0.03	0.16	0.00	1.00
0010	0.10	0.30	0.00	1.00	0.10	0.31	0.00	1.00	0.19	0.39	0.00	1.00
1001	0.01	0.09	0.00	1.00	0.01	0.08	0.00	1.00	0.02	0.13	0.00	1.00
0001	0.07	0.26	0.00	1.00	0.07	0.25	0.00	1.00	0.14	0.35	0.00	1.00
1000	0.02	0.16	0.00	1.00	0.02	0.15	0.00	1.00	0.06	0.24	0.00	1.00
0000	0.15	0.35	0.00	1.00	0.16	0.36	0.00	1.00	0.30	0.46	0.00	1.00
Education												
Inadequately Completed	0.01	0.10	0.00	1.00	0.06	0.24	0.00	1.00	0.41	0.49	0.00	1.00
General Elementary School	0.06	0.24	0.00	1.00	0.15	0.36	0.00	1.00	0.21	0.40	0.00	1.00
Basic Vocational Qualification	0.22	0.41	0.00	1.00	0.20	0.40	0.00	1.00	0.02	0.13	0.00	1.00
Intermediate General Qualification	0.03	0.17	0.00	1.00	0.01	0.11	0.00	1.00	0.00	0.05	0.00	1.00
Intermediate Vocational	0.27	0.45	0.00	1.00	0.06	0.23	0.00	1.00	0.00	0.01	0.00	1.00
General Maturity Certificate	0.04	0.20	0.00	1.00	0.08	0.28	0.00	1.00	0.15	0.36	0.00	1.00
Vocational Maturity Certificate	0.09	0.29	0.00	1.00	0.16	0.37	0.00	1.00	0.03	0.16	0.00	1.00
Lower Tertiary Education	0.09	0.29	0.00	1.00	0.02	0.15	0.00	1.00	0.00	0.00	0.00	0.00
Higher Tertiary Education	0.16	0.37	0.00	1.00	0.24	0.43	0.00	1.00	0.18	0.39	0.00	1.00
West vs. East Germany	0.75	0.43	0.00	1.00	0.92	0.27	0.00	1.00	0.87	0.34	0.00	1.00
Population density												
GKK > 2.000	0.06	0.24	0.00	1.00	0.02	0.15	0.00	1.00	0.02	0.12	0.00	1.00
GKK 2000 - 5000.	0.10	0.30	0.00	1.00	0.05	0.22	0.00	1.00	0.06	0.23	0.00	1.00
GKK 5000 - 2000	0.29	0.45	0.00	1.00	0.24	0.43	0.00	1.00	0.23	0.42	0.00	1.00
GKK 20000 - 50000	0.18	0.38	0.00	1.00	0.21	0.41	0.00	1.00	0.22	0.42	0.00	1.00
GKK 50000 - 100000	0.09	0.28	0.00	1.00	0.09	0.29	0.00	1.00	0.12	0.33	0.00	1.00
GKK 100000 - 500000	0.13	0.34	0.00	1.00	0.17	0.37	0.00	1.00	0.20	0.40	0.00	1.00
GKK 500000 +	0.15	0.36	0.00	1.00	0.22	0.41	0.00	1.00	0.15	0.36	0.00	1.00
Observations	16658				3790				4723			

SM 3 - Social isolation index cut off choices – in detail

We base the construction of social isolation on the seminal work on the need to belong by Baumeister and Leary (Baumeister & Leary, 1995). The authors set out two principles for the sense of belonging that guide our definition of social isolation. First, the principle of *satiation* refers to the need for a minimum level of social connectedness to be present. This means that individuals evaluate themselves as lonely primarily if a certain degree of social connectedness is not present. It implies a threshold effect of social connectedness on loneliness. From this principle we derive relevance of analyzing social isolation, as a categorical concept, instead of degrees of social connectedness. Second, the *substitution* principle refers to the idea that certain social connections can replace others, hence shielding from isolation to a certain extend. This is reflected in the composition of this variable.

Social connections can cover different dimensions of social life, for example family and household, social activities, or social support (Cornwell & Waite, 2009). If an individual lacks these social linkages within a certain dimension, we will define the individual as being *deprived* in this particular social dimension in contrast to being *integrated*. If individuals are deprived in several dimensions, thereby not satisfying the *satiation* criterion, we will consider them to be overall socially isolated.
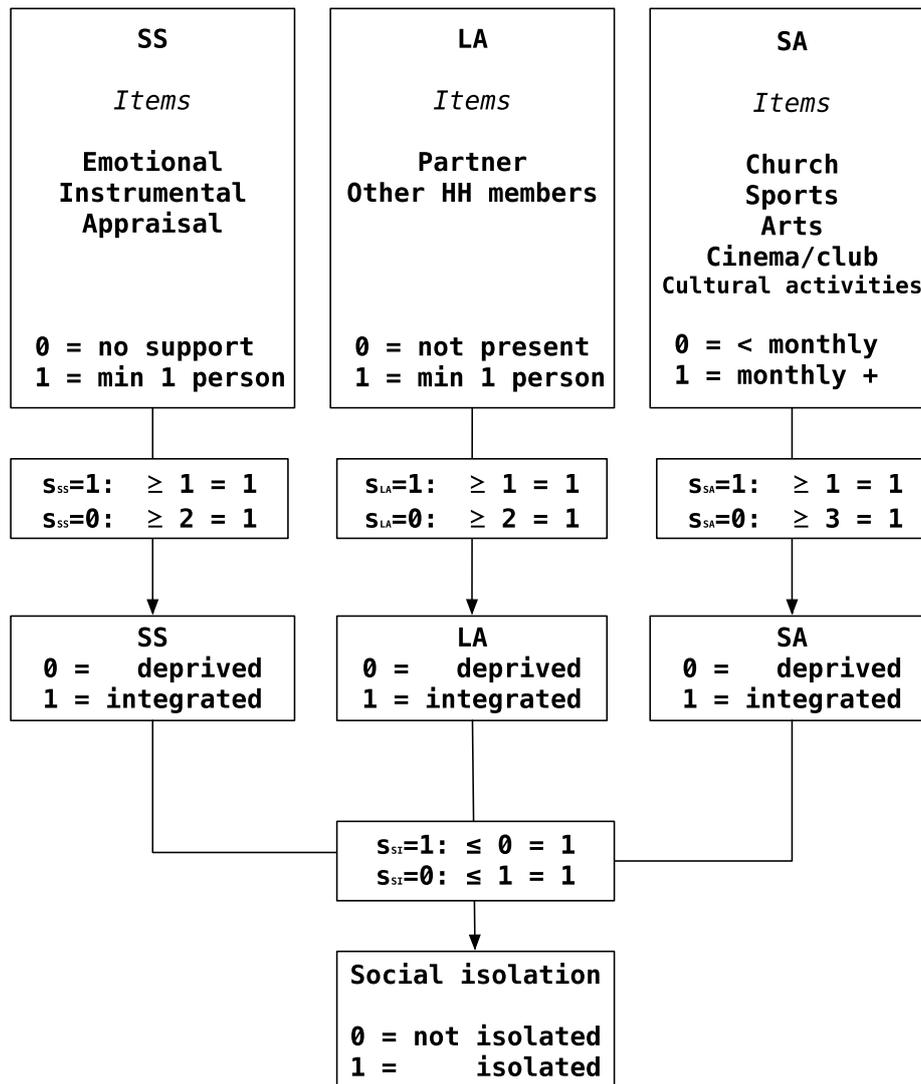
Concretely, we measure social isolation across three domains consisting of several indicators (Cornwell & Waite, 2009):

1) the size of the support network (SS) as surveyed by means of the number of individuals named in a name generator on social support in three categories. The SOEP contains the social support items (SS) for refugees in 2017 and for the host population and other migrants in 2016. Hence, we transmit the 2016 information for SOEP participants to 2017.

2) living and partnership arrangements (LA) a) having a spouse and b) presence of other household members.

3) frequency of attending social activities (SA) a) church, b) cultural activities, c) cinema/disco, d) sports, e) arts.

As there are different reasonable thresholds, which can be used to define social isolation across the different social domains, we create different variants of our indicator. These cut offs vary across the degree of substitution that can be integrated within a dimension. For instance, we identify a deprivation in the dimension of social support networks first, when someone has named no one as social support provider. In a second variation, we consider someone as deprived who only names 1 person per dimension. Variation one allows full substitutability, the other one partial substitutability. Moreover, we assume the absence of substitution theoretical implausible as it would lead to empirical extremely high levels of social isolation.

For each indicator and domain as well as the final addition of domains we test two alternative cut offs: one that allows for more and another allowing for less substitution. Overall, we derive 16 different social isolation indicators based on both principles.

Figure S4: Coding scheme for social isolation

SS	LA	SA
Items	*Items*	*Items*
Emotional Instrumental Appraisal	Partner Other HH members	Church Sports Arts Cinema/club Cultural activities
0 = no support 1 = min 1 person	0 = not present 1 = min 1 person	0 = < monthly 1 = monthly +

$s_{SS}=1$: ≥ 1 = 1 $s_{SS}=0$: ≥ 2 = 1	$s_{LA}=1$: ≥ 1 = 1 $s_{LA}=0$: ≥ 2 = 1	$s_{SA}=1$: ≥ 1 = 1 $s_{SA}=0$: ≥ 3 = 1

SS 0 = deprived 1 = integrated	LA 0 = deprived 1 = integrated	SA 0 = deprived 1 = integrated

$s_{SI}=1$: ≤ 0 = 1
$s_{SI}=0$: ≤ 1 = 1

Social isolation

0 = not isolated
1 = isolated

[a] The numbers 0 and 1 in the summary stages of indicators refer to s = 1: full substitutability. s = 0: partial substitutability. They are also part of Figure 2 below to signal the combinations of partial and full substitution. SS= social support, LA= living and partnership arrangements, SA= social activities, HH= household.

Overall, the different coding strategies across all domains and indicators leaves us with 16 alternative social isolation variables.

$$I_{js_j} = D[0,1], D = 1 \mid \sum_{k_j=1}^{k_j} C_{k_j} \geq t_{s_j}, j \in \{SS, LA, SA\}, s_j \in \{1,0\} \qquad (1)$$

The D_{js} indicates the state of integration (1) versus deprivation (0) in dimension j applying threshold t_{s_j} which either allows for fully substitutability ($s_j = 1$) or only partial substitutability $s_j = 0$. k_j indicates the number of indicators C_{k_j} used to measure social connections in each dimension. Based on this coding of integration per dimension, social isolation is then defined as:

$$SI_{s_j} = D[0,1], D = 1 \mid \sum_{m=1}^{3} I_{js_j} \leq t_{s_{SI}}, j \in \{SS, LA, SA\}, s_{SI} \in \{1,0\} \qquad (2)$$

This means that an individual is defined as being social isolated if the number of dimensions it is integrated into is equal or lower than a certain threshold $t_{s_{si}}$.

**Figure S5**: Distribution of loneliness score by migration status
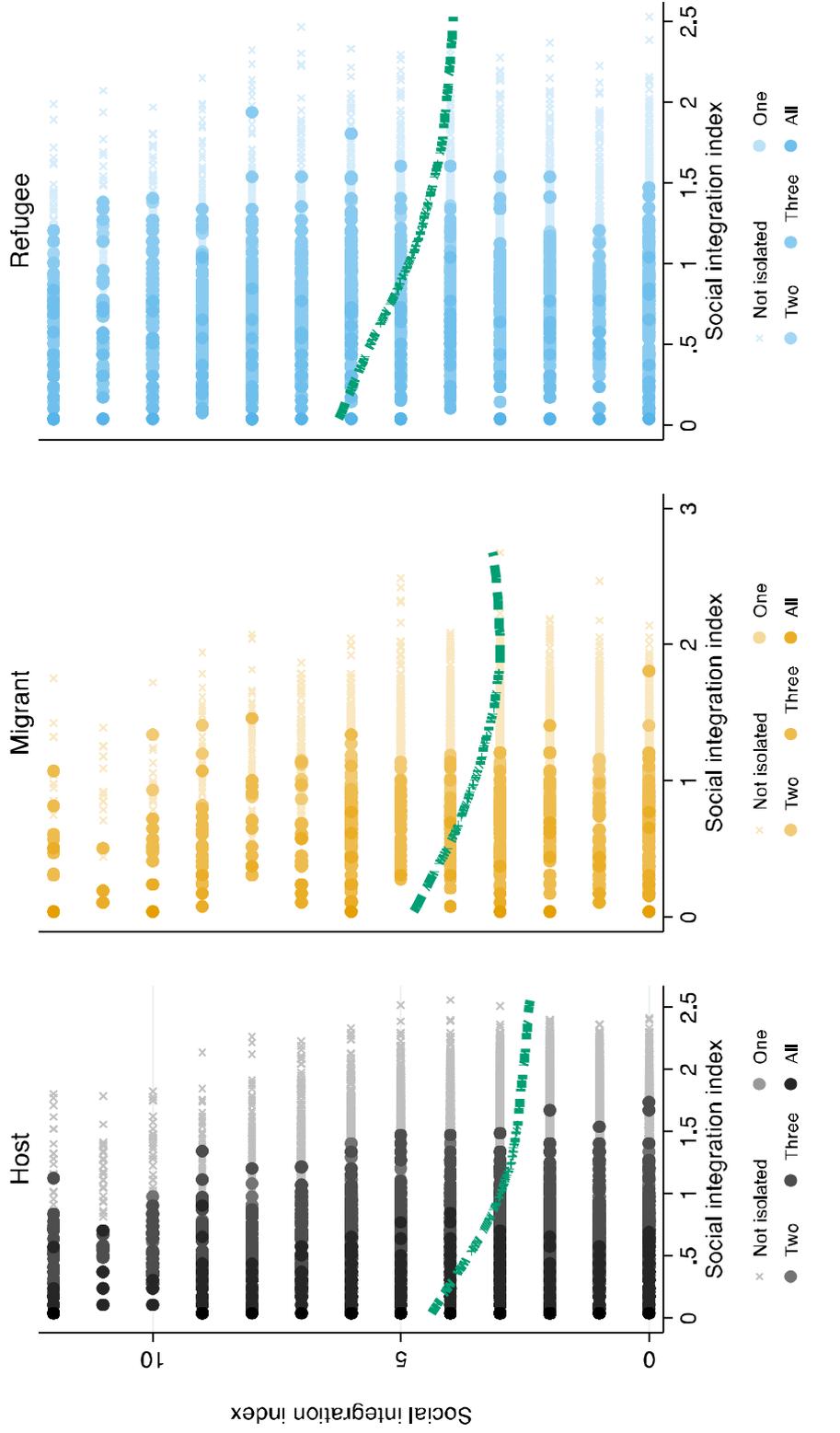
Note: Observed data points are plotted over the loneliness index and an index of social integration. The different shadings indicate under which coding the observation is considered to be socially isolated. Listed are the number of dimensions in which full substitution is allowed. As noted in the manuscript, the more substitution is allowed, the fewer observations are isolated. The dashed line shows the functional relationship between social integration and loneliness estimated by non-parametric LOESS regression.

Figure S6: Distribution of loneliness score by migration status
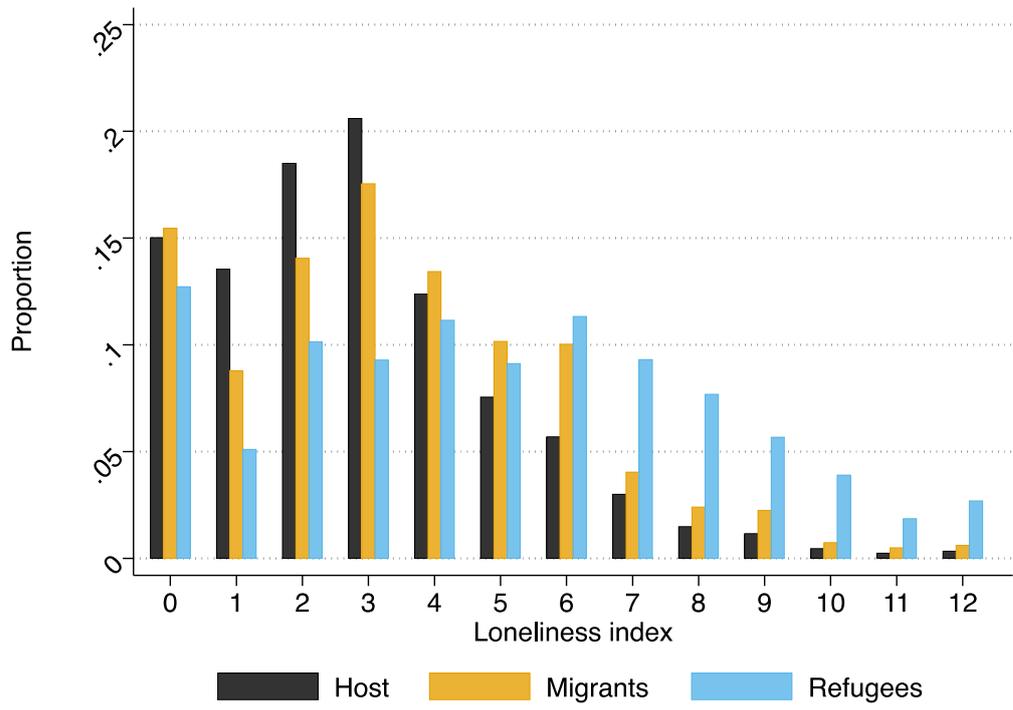
SM 4 – Choice of effect size threshold for contextual relevance hypothesis

Figure S7: Relationship between support for H1 and effect size threshold
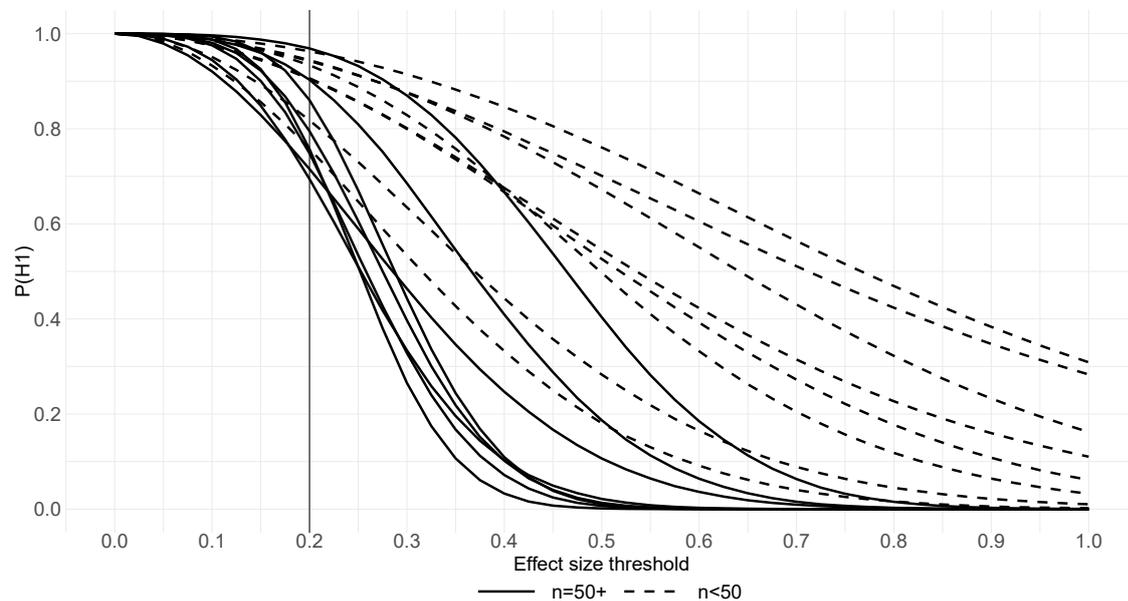
Note: The figure shows the relationship between choice of the effect size threshold and support for *contextual relevance* hypothesis H_1. for all 16 codings (divided into those with sufficient and those with non-sufficient minimum number of observations in the social isolation category).

With respect to the effect size threshold chosen in H_1, one could of course consider other values for this cut-off. Figure S6 shows the relationship between this choice and the degree of support H_1 would get using our data and model.

The higher the threshold is chosen (meaning only very large differences in effect size are considered to be consequential), the less support H_1 gets. We chose a reference cut-off of 0.2 SD, because this value about the size of the maximum difference in loneliness that is found between different age groups (age range 20 to 80) in a previous study using German data (Luhmann & Hawkley, 2016). It is therefore a cut-off that considers only substantial differences (approximately as large or larger than strongest differences found across all age) as evidence in favor of H_1. Consequently, the strong support we find for H1 corroborates the visual impression of figure 3 in the manuscript that the differences between the migrant group and the host and refugee group are indeed substantial in size and meaningful.

SM 5 - Multiverse analysis and discussion

Recent research proposes that studies based on secondary data analysis report all plausible specifications of their data coding and sample definitions (Simonsohn et al., 2019; Steegen et al., 2016). It reduces the probability of reporting findings, specific to certain idiosyncratic decisions in the process of the data analysis (Orben et al., 2019; Rohrer et al., 2017). Based on the definition of social isolation and the different cut offs presented additionally to alterations in sample definition and coding, we report all plausible specifications in a multiverse framework (specifications are listed in Figure S6).

As the section on the social isolation index indicates, researchers not only take decisions on how to construct different measures of a concept. Through these decisions, they can have influence on the results presented.

In our analyses, we take several major coding decisions. In the following, we explain these different decisions. After that, we present the analyses with all the varying decisions taken to show how our results vary by specification. This method showing the volatility or robustness of results is called a multiverse analysis, as prominently features amongst others in the work by Rohrer et al. (2017).

Figure S8 shows four different areas in which this article sets out different specifications, leaving us with a theoretical set of 1920 sample specifications to test in the analysis.

1) We present two different coding schemes for the UCLA Loneliness Scale.

2) We test 5 different specifications regarding control variables: besides always controlling for gender and age, we test for (a) east/west differences, (b) leaving out any covariates, (c) size of population in the area, (d) education levels, and (e) all indicators combined.

3) We test 5 different sample restrictions: (a) leaving out individuals who applied for asylum before 2013, (b) leaving out second generation migrants, (c) including all individuals from the 2017 SOEP survey, (d) leaving out individuals age < 54, (e) leaving out individuals age < 65

4) Due to the different possible cut offs, 16 different social isolation indicators are derived in preparation of the analysis.

Figure S8: Overview of specifications

Coding of Loneliness

Controls

Sample restrictions

Coding of social isolation
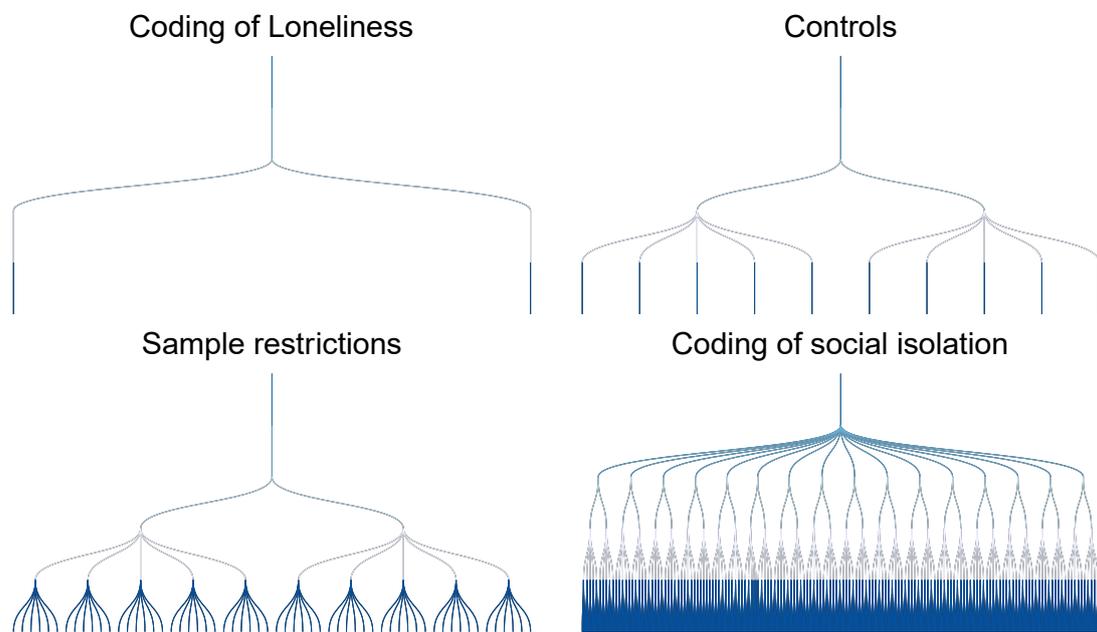
SM 6 – Specification curve analysis

The derived posterior means and credible intervals in the manuscript are not the indicators we are most interested about in our analysis. Aim of this study is to retrieve Bayes factors and Posterior Model probabilities that allow for a comparison of hypotheses. Unfortunately, it is difficult to derive these estimates with 1887 converged results per group of interest. 33 of the total 1920 models did not converge.

Hence, we have summarized the results from the multiverse framework further, along the lines of the 16 social isolation indicators.

Figure 4 of the manuscript shows the standardized effect sizes of the association between social isolation and loneliness on the X-axis. Meanwhile, the Y-axis provides us with the 16 different alternative social isolation indicators used. Per indicator, we present one posterior mean and credible interval per group.

How does one arrive at only three outcomes when in fact we started out with results from 1887 model specifications? Figure S8 shows how we created an overall mean from the posterior mean and the credible interval of all specifications for the social isolation indicator included in the model. The method allows discussing the differences in association depending on the specification of the social isolation index without going too much into detail about the possible other specifications.

In this example below, the graph shows the size of the association for a model specification where social isolation is coded with a soft cut of in the social network domain, a hard cut off in the living arrangement domain, a soft cut off in the social activities domain and a soft cut off for the summary of the overall domains.

Figure S9: Bayesian model averaging over specifications for the estimates of standardized posterior mean and credible interval of the association between social isolation and loneliness – an illustrative example
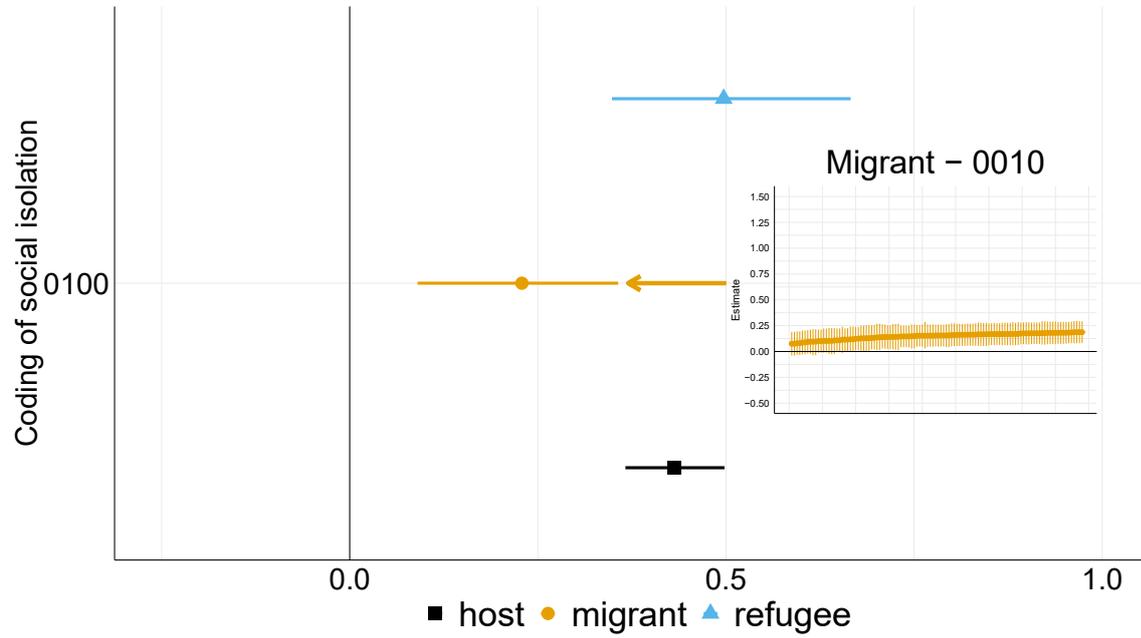
SM 7 - Bayesian Evaluation of Informative Hypotheses

To illustrate the Bayesian Evaluation of Informative Hypotheses (BEIH) and the ranking of the different hypotheses, we use the *increased need hypothesis* (H_{2a}) as an example.

$$\beta_h < \beta_m < \beta_r$$

The hypothesis proposes a ranking of the strength of association between social isolation and loneliness. $\text{\ss}_h$ represents the parameter for the host population, $\text{\ss}_m$ the parameter for migrants of the first generation and $\text{\ss}_r$ the parameter for refugees. In this case, the hypothesis does not propose equal strength of association but a ranking. This is indicated by the equality sign between parameters. Derived from an increased need to have social contacts, the hypothesis postulates the largest association between social isolation and loneliness for the group of refugees, with decreasing association parameters for migrants and refugees.

Applying BEIH we first specify alternative hypotheses with the different rankings proposed between parameters (see Table 1).

Next, every hypothesis possesses a defined prior that is the probability of finding the hypothesis in the data by chance. The more restrictions or inequalities we place between parameters in one hypothesis, the less support we will find in the data by chance. For example, H_3 represents the hypothesis without any rankings between parameters. It accepts all possible inequalities between the coefficients. Consequently, the *contextual relevance* hypothesis receives a prior of one, while the four hypotheses belong to the set of context moderation hypothesis have priors based on the number of constraints between parameters. The *flight exceptionalism hypothesis* (H_{2b}) is much more elaborate that H_3, with one restriction in relation to how the association found in the refugee population should be compared against the host- and migrant population. Most restrictions are placed between the hypothesis including two signs of order, such as the increased need hypothesis (H_{2a}). The likelihood to find these hypotheses by chance further decreases. Hence, their prior probabilities are smaller as well.

Applying our regression models on the data using INLA, we retrieve a posterior distribution. From this distribution, it is possible to draw random samples. From a sample of e.g., 100 000 draws we can now ask the question: How often does e.g., hypothesis H_{2a} hold true in our sample from the posterior distribution? We calculate the marginal likelihood of observing one hypothesis and compare it to the expected likelihood given by chance (our prior distribution). Given the observed support for the posterior distribution and the expected support from the prior of the hypotheses, we can calculate the so-called Bayes factor for each hypothesis (BF) (Klugkist, 2008), a comparison between the actual outcome and expectation by chance. The proportion $\frac{1}{d_t}$ denotes the grade of support from the posterior distribution, t standing for the hypothesis under consideration. After that we compare the hypothesis to the alternative, for instance that there is no ordering (H_1). $\frac{1}{c_t}$ is defined as the proportion of the prior distribution (expectation) that is in agreement with the hypothesis t. The formula to derive the Bayes Factor is:

$$BF_t = \frac{\frac{1}{d_t}}{\frac{1}{c_t}} = \frac{c_t}{d_t}$$

SM 8 - Bayesian Evaluation of Informative Hypotheses (BEIH)

Table S8: Main results from figure 2 – Association of social isolation with loneliness

SI-coding	Group	Posterior Mean	LL 95%-CI	UL 95%-CI	min. number of SI
1111	host	0.832	0.281	1.741	4
1111	migrant	0.590	-0.250	1.659	4
1111	refugee	0.967	0.207	1.756	4
1110	host	0.529	0.154	0.957	7
1110	migrant	0.275	-0.250	1.053	7
1110	refugee	0.992	0.479	1.591	7
1101	host	0.559	0.021	1.057	7
1101	migrant	0.899	0.137	1.680	7
1101	refugee	0.728	0.238	1.240	7
1100	host	0.385	0.119	0.617	18
1100	migrant	0.356	-0.197	0.870	18
1100	refugee	0.765	0.457	1.085	18
1011	host	0.990	0.673	1.452	9
1011	migrant	0.532	-0.188	1.225	9
1011	refugee	0.618	-0.050	1.313	9
1010	host	0.541	0.344	0.818	20
1010	migrant	0.210	-0.250	0.623	20
1010	refugee	0.703	0.311	1.164	20
1001	host	0.850	0.593	1.156	15
1001	migrant	0.821	0.303	1.342	15
1001	refugee	0.629	0.269	1.000	15
1000	host	0.468	0.333	0.610	55
1000	migrant	0.298	0.014	0.558	55
1000	refugee	0.564	0.335	0.808	55
0111	host	0.628	0.472	0.803	30
0111	migrant	0.428	0.095	0.751	30
0111	refugee	0.692	0.360	1.038	30
0110	host	0.461	0.363	0.566	94
0110	migrant	0.203	-0.004	0.392	94
0110	refugee	0.668	0.452	0.888	94
0101	host	0.655	0.548	0.772	70
0101	migrant	0.297	0.030	0.538	70
0101	refugee	0.560	0.365	0.772	70
0100	host	0.431	0.366	0.498	263
0100	migrant	0.229	0.090	0.357	263
0100	refugee	0.497	0.349	0.666	263
0011	host	0.512	0.394	0.650	97
0011	migrant	0.278	0.081	0.463	97
0011	refugee	0.424	0.232	0.621	97
0010	host	0.402	0.322	0.493	267
0010	migrant	0.149	0.017	0.271	267
0010	refugee	0.410	0.254	0.565	267
0001	host	0.465	0.383	0.557	182
0001	migrant	0.221	0.060	0.368	182
0001	refugee	0.408	0.249	0.580	182
0000	host	0.376	0.315	0.442	435
0000	migrant	0.166	0.053	0.272	435
0000	refugee	0.403	0.271	0.546	435

Note: Posterior mean = Posterior mean of the posterior distribution of the social isolation coefficient.
LL 95%-CI: Lower limit of the 95% credible interval of the posterior distribution of the social isolation coefficient.
UL 95%-CI: Upper limit of the 95% credible interval of the posterior distribution of the social isolation coefficient.

SM 9 - References

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CHAPTER 3

Taking stock: refugee family structure and spatial distribution

Family separation and refugee mental health – A network perspective

This is the peer-reviewed version of the following article:

Abstract

How do the structure and relational features of family networks affect refugees' mental health after migration, particularly when refugees are geographically separated from their family? Using the first wave of the IAB-BAMF-SOEP Survey of Refugees, which is representative of the population of refugees who arrived in Germany between 2013 and 2016, this study finds that the size of the nuclear family has a significant positive relationship with refugees' mental health, whereas family separation has a significant negative relationship. In addition to members of the nuclear family, only fathers show a significant positive correlation with refugees' mental health. The structural and relational aspects are discussed in light of health literature focusing on migration stressors and their relationship with mental health as well as in the context of changing family reunification policies in Germany amid the increase in immigration of refugees since 2015.

1. Introduction

While most forcibly displaced people resettle within their home countries, around one third become refugees, often fleeing to neighboring countries (UNHCR, 2017). Few migrate further, though their numbers have increased in recent years. Migration routes via Turkey, the Mediterranean Sea, and Eastern Europe as well as international resettlement programs have brought a new influx of refugees to Europe. Germany registered 745,545 asylum applications in 2016 alone (BAMF, 2019)– a new all-time high. The majority of recently arrived refugees came by dangerous migration routes and struggle with daily life in their host communities. Their mental health, a prerequisite for integration into a new environment (Bakker, Dagevos, & Engbersen, 2014) is in jeopardy. The World Health Organization (WHO, 2014) defines mental health as "[…] a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community." Mental health can be described as a continuum ranging from the presence of health, referred to as mental flourishing, to its absence, known as languishing (Keyes, 2002). Evidence suggests that refugees' mental health suffers repeated strains in the ongoing process of integration. It is therefore of utmost importance for host communities to promote factors that support their mental well-being, which is ultimately a precondition for being able to participate fully in the new environment.

Looking at protective factors for refugee mental health following immigration, there is relative consensus in the health sciences that social networks, links of social interactions, are generally associated with flourishing mental health (Berkman & Glass, 2000; Berkman & Syme, 1979; Cohen, Gottlieb, & Underwood, 2001; Cohen & Janicki-Deverts, 2009; Cohen & Wills, 1985; Kawachi & Berkman, 2001).[17] Evidence shows that with growing social networks, mental health improves over time (M. Seeman, Seeman, & Sayles, 1985). Additionally, studies on social interventions such as support groups, mentoring programs, and initiatives designed to strengthen families have sought to

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[17] The phenomenon of embeddedness in social networks and the associated access to social support is often referred to as "social capital" in the literature. It was first systematically discussed by Bourdieu (1985) and later applied in the migration (Bilecen and Cardona, 2018; Boyd, 1989; Faist, 2000; Lamba and Krahn, 2003; Ryan et al., 2008) and health contexts (Lin et al., 1999; Song et al., 2011). I make use of the sub-concepts of social capital: social network size, role relations, and social support.

demonstrate a causal relationship between social networks and mental health (Berkman, 1995; Cohen, 2004). Above all, ties between relatives promote self-worth and provide guidance and emotional care (Agneessens, Waege, & Lievens, 2006; Lin, Ye, & Ensel, 1999; Thoits, 1982, 2010, 2011), resources that positively affect mental health. So far, mainly qualitative studies have investigated the protective role of the family in forced migration. Health related research has meanwhile focused on the prevalence of mental illness and migration stressors but not on possible beneficial influences.

This study addresses this lacuna, looking at attributes of refugees' family networks and their association with refugees' mental health. It examines refugees' mental health through the lens of family network structure and relational aspects. The data come from the IAB-BAMF- SOEP Survey of Refugees (v.33.2, N = 4456), which is representative of the population of refugees who arrived in Germany between 2013 and 2016 and was drawn from the Central Register of Foreign Nationals (*Ausländerzentralregister*). For this analysis, I define refugees in Germany not as individuals who have been granted asylum but as those who have applied for asylum, independent of their legal status. As mental health is seen as a factor in integration (Bakker et al., 2014), this paper focuses on the association between kinship network characteristics and general mental well-being of refugees living in Germany. The Mental Health Component Summary Scale (MCS) of the Short Form Health Survey (SF-12) operationalizes mental health in the analysis.

Using this representative survey data, the paper contributes to several aspects of the social network and mental health research on refugees. First, unlike previous health-related studies, it uses the term "social network" in its truest sense. It provides a detailed mapping of ties and geographic distances between refugees and their family members in egocentric networks and thus offers insight into the size and geographic distribution of a potential support network that still exists after migration. It does not, however, examine alter-alter relations in refugees' family networks, which cannot be observed in the data at hand. Second, the paper sheds light on the existence of different links between refugees and members of their extended families, which have not been studied to date in quantitative terms. Third, this study takes a multivariate approach, controlling for several migration stressors experienced before, during, and after migration.

2. Family social networks and refugee mental health

Social networks are recognized as having a direct influence on mental health (Cohen & Wills, 1985; Kawachi & Berkman, 2001; Lin et al., 1999; Thoits, 2011). The mental health literature distinguishes network structure from the function of the network, which refers to the various forms of support provided by the existing structures (Cohen and Wills, 1985; Kawachi and Berkman, 2001). This paper investigates a structural dimension of refugee family networks: family network size. Since this structural measure does not tell us who in the network plays the main role in linking network size with mental health, the paper extends the analysis to cover relational features of the network and investigates the composition of family networks. Additionally, as refugee families are often geographically dispersed, separation from family members is discussed as a possible stressor associated with low mental health (languishing).

The term "family" refers to a group of two or more individuals who are related by birth or legal status or who otherwise present themselves as a family. It is hence difficult to formulate a common definition of who falls within this group (Office of the High Commissioner for Human Rights, 1990), and legal definitions vary from country to country. A basic family unit is the nuclear family, consisting of spouses or partners and any minor children. Yet, this concept of the nuclear family is derived from specifically Western perspectives in the research on cohabitation, which have overlooked family structures in other parts of the world (Edgar, 2004). In non-European countries, the household often includes extended family(Baykara-Krumme & Fokkema, 2019; Steinbach, 2013; Trask, 2010). In this study, I therefore analyze refugee family networks from both perspectives, looking at the nuclear family, comprised of spouses or partners, minor and adult children, and at the extended family, comprised of parents, siblings, and other relatives.

2.1 Refugee family networks: size

Prominent structural network characteristics, such as network size, are considered indicative of the degree of access to valuable resources (Bastani, 2007; Thoits, 2011). Such resources can have a beneficial impact on mental health by providing social influence, support and promoting positive affect and improved neuroendocrine responses (Berkman & Glass, 2000; Cohen & Wills, 1985). People with larger social networks recover faster from mental illness (see for instance, Corrigan & Phelan, 2004), probably because they have more social support (Burt, 1987; Lin et al., 1999; T. E. Seeman & Berkman, 1988; Wellman & Frank, 2000). Network size does not necessarily change as a result of migration, as shown by Viry (2012), and even in situations of stalled migration, social networks continue to provide resources (Palmgren, 2016). The first research question asks whether family size is associated with refugee mental health: I expect that the larger the size of refugees' nuclear and extended family social networks, the more significant and positive the correlation with refugee mental health. Distinguishing between nuclear and the extended family, this paper addresses the meaning of larger family structures that are common in refugees' cultures of origin.

A more recent strand of literature has suggested that network size is less relevant in providing social support in the specific context of migration(Cheung & Phillimore, 2018; Herz, 2015; Kornienko, Agadjanian, Menjívar, & Zotova, 2018). This implies that network size might not tell the whole story of an individual's embeddedness within family networks. The next section therefore explores compositional features of refugees' family networks as important relational correlates of refugee mental health (Smith & Christakis, 2008; Wellman & Wortley, 1990).

2.2 Refugee family networks: composition

The compositional approach underscores the importance of direct relationships to flourishing mental health, asking which specific network members are most important. Different types of social ties, here referred to as role relations, provide different kinds of resources (Agneessens et al., 2006; Antonucci, Fiori, & Kackey, 2010; Fiori, Smith, Antonucci, & Arbor, 2007; Moore, Prybutok, Ta, & Amey, 2018)

that affect mental health to varying degrees. Role relations represent different categories of social ties within a network, including relatives, friends, coworkers, acquaintances, and service providers (Agneessens et al., 2006). By tightening the focus to the specific kinship network, this approach makes the spouse or partner, children, siblings, parents, and other relatives the units of analysis.

Family members usually supply the most important resources for general mental well-being (Agneessens et al., 2006). They offer care, emotional encouragement, comfort, and aid (Agneessens et al., 2006; Bilecen & Cardona, 2018; Cobb, 1976; Shor, Roelfs, & Yogev, 2013; Thoits, 2011; Wellman, 1991; Wellman & Wortley, 1989, 1990). By providing a sense of safety, kinship ties encourage rational problem-solving capacities (Thoits, 2011). Moreover, relatives are often the first to act in cases of acute need (Carpentier, Lesage, & White, 1999). In particular, it is the continuity of support that distinguishes the family network from other sources of mental health support (Sapin, Widmer, & Iglesias, 2016). Overall, family support is less bound to expectations of reciprocity than support from friends and acquaintances (Thoits, 2011; Wellman and Wortley, 1989). Family sociology has long disentangled the different degrees to which family role relations differ in providing resources, a view also affirmed by ethnographic accounts on migration in general and refugee families in particular. The emotional bond between parents and adult children has been shown to be one of the most supportive family role relations (Wellman and Wortley, 1990, 1989). Mother-daughter and father-son relationships provide especially significant resources (Wellman and Wortley, 1990). In families that have been forced to migrate, children become important attachment figures for their parents. Weine et al. (2004) refer to this phenomenon as "living through children": upon arrival in the host country, parents make plans for their children and thus become active in their community. In some cultural settings, young adults live with their parents until marriage, a practice that is crucial to pooling valuable resources in a new environment (Busch Nsonwu, Busch-Armendariz, Cook Heffron, Mahapatra, & Fong, 2013). After marriage, the partner becomes an even more important provider of mental health resources than other relatives. Beiser & Hou (2017) show that living with a spouse and children in the household positively affects the mental health of refugees.

Members of the extended family have been found to generally provide lower levels of mental health resources than the nuclear family. Siblings fulfil similar functions to friends (Wellman and Wortley, 1990, 1989). They do not provide as much support as parents or adult children but can still be expected to provide resources if needed. Occasionally, other relatives offer short-term support but are less likely to provide, for instance, long-term care in cases of serious mental health issues (Perry & Pescosolido, 2012; Wellman & Wortley, 1989, 1990). However, following migration, relatives become a kind of fallback option since networks in the host community are often difficult to establish (Boyd, 1989; Hernández-Plaza, Pozo, & Alonso-Morillejo, 2004; Lamba & Krahn, 2003; Lewis, 2008; Williams, 2006). Cousins, aunts, and uncles are a natural part of daily social interactions in migrant and refugee communities (McMichael & Manderson, 2004; Simich, 2003; Whittaker, Hardy, Lewis, & Buchan, 2005). Extended family establishes a sense of belonging in an unfamiliar environment (McMichael et al., 2011) and provides support in decision-making processes (Simich et al., 2003). Overall, the association between relational resources from family networks and health outcomes is of particular interest in the refugee setting, where other ties have been weakened or broken by migration (Wells, 2011).

I explore the association between family role relations and refugee mental health, formulating a second hypothesis: I expect that having a partner or spouse, parents, children, siblings, or other relatives, living in the same country as the refugee or elsewhere, is positively and significantly associated with refugee mental health.

2.3 Refugee family networks: separation

Migrants' family networks are also defined in many cases by geographic separation. A study of labor migration to the United States reports that up to 85 percent of migrants' nuclear families are separated, in many cases because parents have left their children with extended family such as grandparents, aunts, and uncles to work abroad (Suarez-Orozco, Todorova, & Louie, 2002). If one considers extended family networks, nearly every migrant leaves family members behind. In the refugee context, families often

must leave some members behind. Especially the elderly seldom leave regions of conflict (Weine et al., 2004).

Family separation does not necessarily lead to reduced social support. Social network studies show how transnational ties remain important resource providers (Dahinden, 2005; L. Ryan, 2004; Viry, 2012). While family members living far away have difficulties providing tangible support, transnational networks can still offer intangible and above all emotional support (Herz, 2015; Ryan et al., 2008; Viry, 2012). Especially in the case of younger migrants abroad, family members in the country of origin provide material and non-material resources (Boccagni, 2012; Kornienko et al., 2018). Transnational ties have indeed been shown to protect against symptoms of depression (Jasinskaja-Lahti, Liebkind, Jaakkola, & Reuter, 2006; Kornienko et al., 2018).

Qualitative migration research shows that family separation is associated with changes in power relations among family members and can therefore be regarded as a stressor. Women become more independent of partners or parents in times of separation, which can lead to conflict and insecurity in family relationships (Rask, Warsame, & Borell, 2015). Geographic dispersion limits access to resources, especially for children (Rask et al., 2015). Children grow apart from their parents (Suarez-Orozco et al., 2010), increasing symptoms of depression, not just in children themselves but also in mothers (Suarez-Orozco et al., 2002). Meanwhile, parents report not feeling valued for the sacrifices they make working abroad (Fresnoza-Flot, 2009). Further, a lack of geographical proximity negatively affects the actual tangible provision of resources in the network (Bilecen & Cardona, 2018; Boyd, 1989; Simich, 2003; Simich, Beiser, & Mawani, 2003; Simich, Beiser, Stewart, & Mwakarimba, 2005). Hence, family relations in a transnational setting are no guarantee that flourishing mental health can be maintained.

In the refugee context, family separation has been shown to evolve into a stressor (Priebe Kucukalic et al., 2012). Predominantly qualitative evidence shows that refugees tend to lose contact with relatives in the country of origin (McNatt et al., 2018; Miller, Hess, Bybee, & Goodkind, 2018; Stevens, 2016; Wilmsen, 2013). Stevens (2016), for instance, analyzes the social networks of close family and friends among Syrian refugees living in Jordan and describes how constant strain dissolves existing networks,

leading to boredom, loneliness, and depression of the refugees. Wilmsen (2013) explores how refugees in Australia wait for family reunification before making plans. Consequences of family separation include poor concentration and feelings of guilt (Williams, 2006; Wilmsen, 2013). Psychiatric studies also explore the effects of family separation. Nickerson, Bryant, Steel, Silove, & Brooks (2010) find that fear of family members being harmed in the country of origin is associated with mental illness. Teodorescu, Heir, Hauff, Wentzel-Larsen, & Lien (2012) as well as Schweitzer, Melville, Steel, & Lacherez (2006) identify family separation as a significant determinant of Post-Traumatic Stress Disorder (PTSD). However, these studies work with limited network information and focus on trauma-related disease. Based on this evidence, I test a third set of hypotheses: I expect that the greater the dispersion between the refugee and the nuclear family, the stronger the negative association with refugee mental health. I further hypothesize that the greater the geographic distance between the refugee and members of the nuclear and extended family, the stronger the negative association with refugee mental health.

3.   Data and method

I use the first wave (v.33.2) of the IAB-BAMF-SOEP Survey of Refugees from 2016 ([dataset] Brücker et al., 2016; Goebel et al., 2018) for analysis. The survey is conducted by the Institute for Employment Research (IAB), the Socio-Economic Panel (SOEP) at the German Institute for Economic Research (DIW Berlin), and the Research Centre on Migration, Integration, and Asylum of the Federal Office of Migration and Refugees (BAMF-FZ). The sampling population consists of refugees who arrived in Germany from 2013 to 2016. Respondents are drawn from the Central Register of Foreign Nationals, including all foreigners in Germany.

Kroh, Kühne, Jacobsen, Siegert, & Siegers (2017) summarize the sampling procedure (stratified multi-stage clustered sampling design) used in the IAB-BAMF-SOEP Survey of Refugees. Due to delays in the registration of refugees in Germany, sampling points were selected four times using updated versions of the Central Register of Foreign Nationals. To ensure variation in known individual

characteristics, different sampling probabilities were used to select individuals, including country of origin, age, gender, and legal status. Moreover, since regional immigration offices are responsible for registering refugees' addresses and have no legal obligation to provide addresses for scientific use, BAMF-FZ contacted all regional immigration offices to obtain the addresses. For the approximately 27,000 individuals in the sample at that time, 25,763 addresses were available. Only a random sub-sample of these addresses was used for the interviews. The response rate of the individuals contacted for interviews was 48%, similar to other SOEP studies (Kroh et al., 2016). Interviewers were provided with translations and audio files of the questionnaires in different languages to assist in interviewing the refugees in their homes or refugee accommodations. Weights adjust for aspects of data collection such as self-selection and selection by design.

It must be noted that although children were also selected from the Central Register of Foreign Nationals to oversample families, unaccompanied minors are not part of the study. A few respondents arrived in Germany alone and were younger than 18 but had reached age 18 by the time of the interview. Therefore, the data only provide a basis for conclusions about refugees above the age of 18. The sample size in the first wave was N = 4456. A working sample excludes all individuals who moved to Germany before 2013 and those who did not apply for asylum (working sample size N = 4332). Additionally, I deleted observations with missing values for all of the variables used (retained N = 3400).[18][19] To test the hypotheses proposed above, I used Ordinary Least Squares (OLS) analysis.

3.1 Independent variables: network size, family composition and family separation

Structural kinship network information is available from several different survey items in the IAB-BAMF-SOEP Survey of Refugees.[20] The following indicators identify network size, family composition, and geographic distance, and dispersion of the refugee kinship ties (Table 1).

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[18] For an overview of sample reduction before analysis, see Table A1.

[19] For an overview of sample reduction by regression, see Table A2.

[20] For an overview of the survey items, see Table A3. The items are not classic name generators but questions on the existence of different family ties and the geographic location of these relatives.

Table 1: Indicators of family social networks.

Aspects of the refugee network	Description	Operationalization
Network size	(1a) Number of members of the nuclear family	Discrete variable for all existing ties (spouse or partner, children below age 18, children above age 18)
	(1b) Number of members of the nuclear and extended family	Discrete variable for all existing ties (nuclear family, parents, siblings, other relatives)
Family composition	(2) Individual dyads with family role relations	Dummy variables for all types of family relationships (spouse or partner, children below age 18, children above age 18, father, mother, siblings, other relatives
Family separation	(3a) Geographic dispersion of nuclear family	Categorical variable for nuclear family and their whereabouts: In same home or locality Some family members in Germany, others abroad Entire family abroad
	(3b) Geographic distance between refugee as well as nuclear and extended family	Dummy variables for distance from each type of kin (spouse or partner, children below age 18, children above age 18, mother, father, siblings, other relatives) In same home or locality In Germany Abroad

3.1.1 Refugee family networks: size

Family network size is the first independent variable of interest in the analysis. I add the number of members in the nuclear family, including the partner or spouse and children below and above the age of 18. The resulting figure is not obtained through the use of name generators but from the direct accounts of survey respondents, yielding a very precise picture. Both spouses and life partners are considered "partners". Children who have died are not included. Moreover, I construct a discrete variable for the size of the extended family, adding the number of siblings, other relatives, and parents who are reported to be alive to the number of members of the nuclear family.

3.1.2   Refugee family networks: composition

Derived from the items on the existence of family relationships, dummy variables point to the various types of family role relations. They specify a dyadic relationship between the refugee and a partner or spouse, and between refugee and mother or father. Others summarize the family role relations in aggregated form: children, siblings, and other relatives (example: for having at least one child, variables are coded 0 = no and 1 = yes).

3.1.3   Refugee family networks: separation

For the analysis of geographic dispersion and distances, variables show the geographic location of different family members under the condition that the given type of relationship exists. A categorical variable summarizes the geographic dispersion of the nuclear family with three characteristics:

(1)   The entire nuclear family is living in the same home or locality;

(2)   The nuclear family is fragmented, dispersed between the refugee's household/local area and households further away in Germany or abroad; or

(3)   The refugee's entire nuclear family lives abroad.

Moreover, dummy variables for each family role relation indicate geographic locations in relation to the refugee residing in Germany. The sets of variables all follow the same coding scheme: (1) the family role relation living in the home or locality; (2) in Germany; or (3) abroad. A categorical variable indicates the geographic distance to partner or spouse. The same code applies to dyadic information on the location of the parents, although the death of a parent renders the parent dyad nonexistent. As information on the whereabouts of children, siblings, and other relatives only exists on an aggregate level, the coding changes for these groups. Dummy variables allow for the recognition of multiple answers per type of role relation.

3.2   Dependent variable: the mental health component summary scale

Ranging from 0 to 100, the Mental Health Component Summary Scale (MCS) describes a continuum from languishing to flourishing mental health. The MCS consists of the four subscales vitality, role emotion, social functioning, and mental health. In this paper, I adapt the MCS to the refugee population of the SOEP (Andersen, Mühlbach, Nübling, Schupp, & Wagner, 2007).[21] I create eight subscales from the twelve initial questionnaire items and standardize them for further use. Second, I retrieve subscales for mental and physical health, running a factor analysis (accepting Eigenvalues of 0.98 to retrieve two factors) on the eight items. The factor loadings become the weights for subsequent construction of the two scales, one of them being the MCS (Andersen et al., 2007).

The MCS is a more inclusive scale than indicators for depression, anxiety disorders, or PTSD. It identifies a state of mental well-being necessary to participate in everyday life. In contrast, trauma screeners for refugees, as used in studies by Fazel, Wheeler, & Danesh (2005), Hollifield et al. (2002), and Lindert, Von Ehrenstein, Priebe Kucukalic, & Mielck (2009) focus on severe mental illnesses resulting from conflict. However, critics argue that the diagnosis of mental illness offers only a victim status (Bracken, Giller, & Summerfield, 1997; Summerfield, 1999) with medical treatment as the sole solution (Hutchinson & Dorsett, 2012). Even if treatment is generally available, refugees face greater challenges in accessing medical care (Thöle, Penka, Brähler, Heinz, & Kluge, 2017). Therefore, lower-level intervention strategies are paramount. The MCS has been used in studying long-term mental health outcomes of refugees, as for instance in relation to labour market access and immigration detention (Bakker et al., 2014; Steel et al., 2006; Steel, Silove, Phan, & Auman, 2002).

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[21] The MCS is also provided as a generated variable in the SOEP. In the generation procedure, the variable is standardized including the German population of the SOEP with 2004 as a reference year (Andersen et al., 2007). Nonetheless, this variable could be used alternatively for replication of this study. Values of the MCS generated for refugees and the MCS generated for both refugees and the German SOEP population are highly correlated (correlation coefficient = 0.98).

3.3   Control variables: indicators of resource loss

Most quantitative studies analyze determinants of refugee mental health by focusing on either pre- or post- migration stressors (Laban, Gernaat, Komproe, Schreuders, & De Jong, 2004; Porter, 2007; Porter & Haslam, 2005; Schweitzer et al., 2006; Silove, Sinnerbrink, Field, Manicavasgar, & Steel, 1997; Steel et al., 2009, 2006). The models used in this paper are based on theoretical considerations of D. Ryan, Dooley, & Benson (2008) and control for resource losses before, during, and after migration jointly as well as for socio-economic information.

All models include age groups (1 = 18–25 years, 2 = 26–35 years, 3 = 36–45 years, 4 > 46 years). Age-dependent mental health outcomes can be expected, as shown, for instance, in Cambodian refugees resettled in the United States (Marshall, Schell, Elliott, Berthold, & Chun, 2005). Older refugees in particular tend to suffer from mental illness after migration (Beiser and Hou, 2017; Porter and Haslam, 2005). Moreover, a dummy variable accounts for possible gender differences in mental health outcomes (0= male and 1=female). Research finds a salient gender discrepancy in prevalence rates of mental illnesses in favor of men (Ahern et al., 2004; Cheung & Phillimore, 2018; Schweitzer et al., 2006; Steel et al., 2009, 2006). Meanwhile, Beiser & Hou (2017) report that older male refugees to Canada are at a greater mental health risk and speculate that this may be due to difficulty in adapting to Western egalitarian social structures. I also use the International Standard Classification of Education to equalize education obtained abroad, without categories for childhood education and short-term tertiary education (ISCED ranging from 1= primary education to 7= doctoral equivalent).

Another set of variables controls for resource losses prior to refugee migration. In this phase, individuals are very likely to experience physical harm (Silove et al., 1997; Steel et al., 2006), loss of income and property, as well as diminishing reputation, self-worth, and social contacts (Phillimore, 2011). A discrete variable hence counts the number of reasons for migration.[22] The country of origin of the respondent (1 = Syria, 2 = Afghanistan, 3 = Iraq, 4 = Eritrea / Somalia, 5 = other) reflects conflicts in different regions.

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[22] For the list of reasons, see Table A4.

Migration stressors are the second migrant-specific set of model features. For reasons of ethically sound survey design, the IAB-BAMF-SOEP survey allows respondents to skip questions on the migration phase to prevent mental distress during their interview. This may create missing values for the costs and length of their journey as well as modes of transport and any traumatic events that may have occurred on the way. After initial checks, the missing values strongly correlate with the MCS. The paper does not include the information in the models, nor does it impute this information for further analysis. Only a categorical variable of time traveled from the home country to Germany is included in all models (1 = one day, 2 = below one month, 3 = up to half a year, 4 = one or more years). The information is derived from the reported number of days from either the last longer transit country or country of origin to Germany.

Post-migration resource losses are the third set of indicators included in the analysis. Current refugee status (1 = in process, 2 = recognized, 3 = tolerated, 4 = other)[23] and the insecurity of not being recognized as a refugee signify potential legal insecurity upon arrival (Laban et al., 2004). The type of housing (shared accommodation in refugee centers = 0, private housing = 1) is an indicator of resource loss (Bakker et al., 2014; Hynie, 2017) as living in refugee shelters is associated with the inability to seek privacy, cook for oneself, or create a permanent home. Further, savings (0 = no and 1 = yes) are a proxy for monetary resources that have not been spent during the journey or while residing in Germany. A dummy variable for being employed (0 = unemployed and 1= employed) signals a potential resource loss in terms of income, country-specific labor market knowledge, and social ties (Porter and Haslam, 2005). Further, I control for members of the nuclear family having died (0 = no and 1 = yes). The analysis also accounts for years since arrival in Germany in the models. Some authors find no association between time since arrival and mental health (Bogic, Njoku, & Priebe, 2015; Lindert et al., 2009; Porter, 2007; Steel et al., 2002). Other studies report a persistence of mental illnesses over the

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[23] In process = residence permission following § 55 German Asylum Act; Recognized = residence permit following § 25 Para. 1 / § 25 Para. 2 / § 26 Para. 3 / § 22 or § 23 Residence Act; Tolerated = following § 60a Residence Act; other = residence permit following § 23a or § 25 Para. 3, 4 or 5 Residence
Act as well as other humanitarian reasons.

years as the stress does not decrease in the new environment (Mollica et al., 2001; Roth, Ekblad, & Agren, 2006; Schweitzer et al., 2006).

4.   Results

4.1   Refugee family network: descriptive statistics[24]

Almost half of the refugees arriving in Germany between 2013 and 2016 came from Syria, followed by Afghanistan and Iraq (Table 2). Results show approximately equal percentages of refugees who have a nuclear family and those who have only extended family (Table 2). Overall, 43% of refugees do not have a nuclear family, that is, a spouse, partner, or children (Table 2). As most of the recently arrived refugees in Germany are young, they have not yet founded their own families. Fifty-two percent have a life partner or spouse; 39% have minor children; and 9% have children above the age of 18. The mean size of the nuclear family is 1.69 persons, much smaller than in the cultural contexts of the refugees' countries of origin (United Nations et al., 2017). Including members of the extended family, the mean family size is 16 individuals. Most refugees have at least one sibling (93%), and more than half of the refugees living in Germany have other relatives (60%). In most cases, the respondents' mothers and fathers are still alive (81% and 63%).

Table 2: Descriptive statistics of network variables, in addition to other variables of interest. [a][b]

	mean	sd	min	max	Total (%)
Dependent variable					
MCS	49.172	10.399	11.042	74.341	
Country of origin					
Country of Origin (Ref. Afghanistan)	0.124	0.330	0	1	
Syria	0.451	0.498	0	1	
Iraq	0.089	0.285	0	1	
Eritrea, Somalia	0.055	0.229	0	1	
Other	0.280	0.449	0	1	
Network size					

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[24] For descriptive statistics of control variables, see Tables A5 and A6

Size nuclear family	1.686	1.992	0	9
Size nuclear + extended family	16.044	16.641	0	143
Having specific role relations (Dummy variables)				
Partner/Spouse	0.522	0.500	0	1
Child below age 18	0.394	0.488	0	1
Child above age 18	0.094	0.292	0	1
Siblings	0.934	0.249	0	1
Father	0.632	0.482	0	1
Mother	0.812	0.391	0	1
Other relatives	0.600	0.490	0	1
Geographic dispersion of nuclear family				
Having no nuclear family				43.38
Entire nuclear family in the same home or locality				38.78
Nuclear family dispersed between household /other localities of Germany / abroad				5.40
Entire nuclear family abroad				12.44

[a] The dummy variables summarizing geographic distances between refugee and different types of family members are presented separately (see Table 3). Further descriptions of control variables are found in Appendices A5 and A6.
[b] Weighted results.

Members of the nuclear family usually arrive in Germany together or at least reunite quickly after arrival: In almost 39% of the cases, refugees have their nuclear family living with them in the same household or at least in the same locality (Table 2). Nonetheless, there are refugees who leave members of their nuclear family behind (Table 3). In 12.4% of all cases, the respondent's entire nuclear family lives abroad. More than 26% of the refugees, who have a partner, report their partner or spouse living abroad. Twenty-three percent of refugee parents in Germany have at least one child below age 18 residing abroad. In fact, adult children are even less likely to live with their parents, with almost 26% of refugees reporting at least one of their children living somewhere else in Germany and 54% reporting an adult child living abroad. Meanwhile, parents, siblings, and other relatives mostly live abroad (Table 3).

Table 3: Family role relations and their geographic location in comparison to the refugee residing in Germany.[a][b]

		At home (%)	In Germany (%)	Abroad (%)
Role relation (Dyadic level)	Partner	68.15	5.77	26.08
	Mother	8.58	3.87	87.29
	Father	7.28	3.41	89.31
Role relation (Group level)	Children below age 18	78.34	1.6	23.19
	Children above age 18	67.21	25.89	53.78
	Siblings	14.83	26.26	92.38
	Relatives	8.49	38.79	87.57

[a] The first set of variables are categorical variables per dyad. The second set of variables is a summary of all existing types of family members and their geographic distribution, coded as dummies since information does not exist on the dyad level. Hence, the geographic distances of group-level role relations do not add up to 100%. For instance, as seen in Table 2, 39% of German refugees have children below the age of 18. In 78% of these cases, at least one of these children lives in the same home or locality. Further, 1.6% report having at least one child living somewhere else in Germany, and in 23.19% of the cases at least one minor child lives abroad.
[b] Weighted results.

4.2 Refugee family networks: size

Regression results show that opportunity structures in the form of kinship network size only partially show a significant association with refugee mental health. I hypothesize that the larger the size of the nuclear and extended refugee family, the more positive and significant the association with refugee mental health. On the one hand, the mean change in MCS for an increase in nuclear family size of one person is positive and significantly below the 5% significance level (Table 4, Model 1). The effect size is rather small, with a change in MCS below one point. On the other hand, the effect is zero when accounting for the size of nuclear and extended family social network (Table 4, Model 2).

Table 4: Association of network size and refugee mental health (regression coefficients). [a][b]

		Model 1	Model 2
Network size			
	Size of nuclear family network	0.421* (0.175)	
	Size of nuclear and extended family		0.000 (0.019)
Controls			
Age (Ref: 18-25 Years)	26-35 years	-0.346 (0.777)	0.112 (0.750)
	36-45 years	-1.304 (0.989)	-0.301 (0.831
	>46 Years	-1.863 (1.087)	-0.459 (0.927)
Education (Ref: no education)	Primary education	0.217 (0.993)	0.183 (0.992)
	Lower secondary education	0.668 (1.048)	0.504 (1.051)
	Upper secondary education	0.373 (1.081)	0.087 (1.068)
	Post-secondary non-tertiary	2.187 (1.432)	1.825 (1.401)
	Bachelor/ Master	-1.099 (1.072)	-1.375 (1.064)
	Doctoral	-2.284 (2.726)	-2.811 (2.646)
Gender: (Ref: male)	Female	-2.423*** (0.613)	-2.052*** (0.603)
Pre-migration stressors			
Country of origin	Syria	1.087 (1.119)	1.052 (1.131)
(Ref: Afghanistan)	Iraq	2.362* (1.154)	2.352* (1.162)
	Eritrea, Somalia	5.473*** (1.177)	5.247*** (1.154)
	Other	0.356 (1.285)	0.164 (1.277)
	Count of number of reasons to migrate	-0.414** (0.144)	-0.421** (0.144)
Migration stressors			
Time traveling to Germany (Ref: one day)	Below one month	-0.214 (1.011)	-0.212 (1.027)
	Up to half a year	-0.125	-0.115

		(1.083)	(1.091)
	One or more years	-3.060	-3.096
		(1.648)	(1.655)
Post-migration stressors			
Asylum status	Decision pending	-1.921**	-1.925**
(Ref: recognized)		(0.714)	(0.707)
	Tolerated status	-2.756*	-2.777*
		(1.217)	(1.224)
	Other	-3.646*	-3.702*
		(1.558)	(1.560)
Type of Accommodation	Shared	-1.813**	-1.967**
(Ref: private)		(0.622)	(0.622)
Savings	No savings	-2.436**	-2.415**
(Ref: savings)		(0.898)	(0.904)
Employment	No employment	-1.101	-1.128
(Ref: employment)		(0.791)	(0.789)
Years since arrival		0.006	0.008
		(0.440)	(0.442)
Member of the nuclear family		-0.664	-0.708
deceased		(1.390)	(1.376)
Constant		55.208***	55.685***
		(2.174)	(2.169)
	N. (unweighted)	3400	3400
	R-squared	0.072	0.069

[a] Standard errors in parentheses.
[b] Weighted results.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Indicators describing stressors throughout the migration process show significant associations with refugee mental health as well. First, refugee women are more likely to suffer languishing mental health than men, with a mean change in MCS of more than two points. The country of origin effect is relatively unexpected: Refugees from the African content have significantly better mental health outcomes than refugees from the Middle East. The effect difference is more than five points in the MCS between Afghans on the one hand Eritreans and Somalis on the other. Moreover, the association between refugee mental health and the number of reasons to migrate is significant. The more traumatic experiences and reasons a person has to flee, the more the MCS decreases. Post-migration stressors are also significantly

related to languishing mental health: a pending asylum decision, living in shared accommodations, and having run out of savings.

4.3 Refugee family networks: composition

Positive and significant associations between family role relations and refugee mental health are not found for every type of family relation (Figure 1). I hypothesize that having ties to individual members of the nuclear and extended family is significantly and positively associated with refugee mental health. According to Figure 1, Column 1, having a partner is significantly and positively related to mental health at the 10% significance level. Having adult children has a small significant positive association with mental health below the 5% significance level (Figure 1, Column 3). Extended family shows a significant positive association with refugee mental health only for fathers below the 5% significance level (Figure 1, Columns 4-7).

Figure 1: Association between family role relations and refugee mental health (regression coefficients and confidence intervals).[a][b][c]
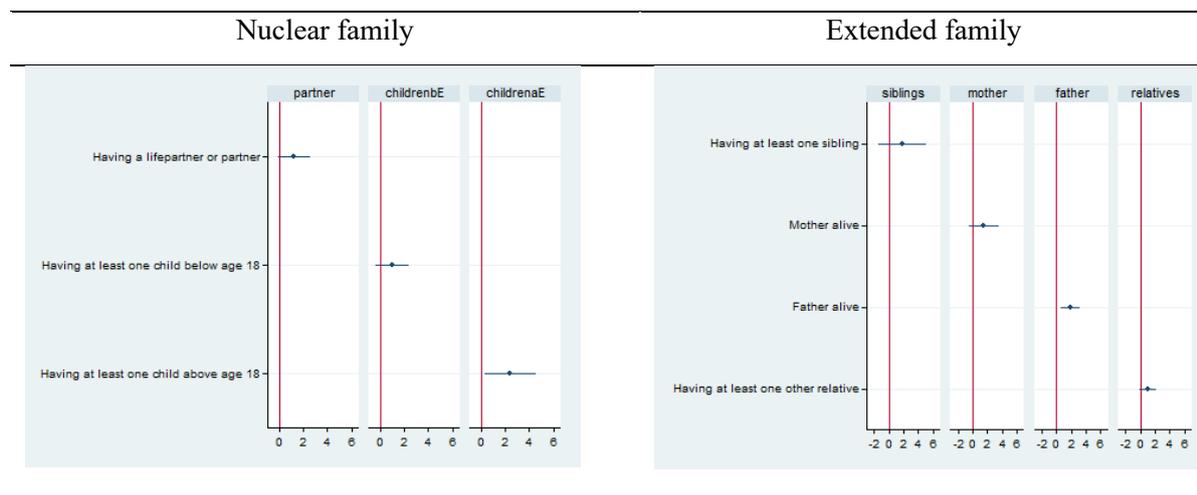
[a] The regressions control for socio-economic circumstances as well as for pre-, peri-, and post-migration stressors as listed in Table A2.
[b] Weighted results.
[c] For the number of observations per regression, see Table A3.

4.4 Refugee family networks: family separation

While network size and composition show only partially positive associations with refugee mental health, the expected negative association with family separation can be confirmed. The third hypothesis states that the further away the nuclear family is from the individual refugee residing in Germany, the more negative and significant the association with the refugee's mental health. As reported in Table 3, not having the nuclear family in the same locality is associated with a significant decline in mental health. The negative association is largest and significant when all members of the nuclear family reside outside of Germany (Table 5). Controlling for other relevant migration stressors, separation from all nuclear family members is highly and negatively significant, with a decrease in the mean MCS of more than four points.

Table 5: Association of geographic dispersion of family members and refugee mental health (regression coefficients). [a][b]

		MCS
Geographic dispersion of nuclear family	Ref: Family all in same house or locality	
	Family spread across Germany and abroad	-1.704 (1.121)
	All members of nuclear family abroad	-4.150[***] (1.000)
N. (unweighted)		2543
R^2		0.090

[a] The regressions control for socio-economic circumstances as well as for pre-, peri-, and post migration stressors as listed in Table A2.
Standard errors in parenthesis.
[b] Weighted results.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The second part of the third hypothesis states that the further away the individual refugee is located from a kinship role relation, the more negative and significant the association with refugee mental health. The results do not show significant negative effects for members of the various types of family relationships living in Germany but does for those living abroad. Having a partner or at least one child below age 18 living abroad is associated with significant decreases in refugee mental health compared to having these individuals in the same locality or at least somewhere in Germany (Figure 2, Row 1-3).

Furthermore, I find a small but positive significant relationship between an adult child living in Germany and the mental health outcome of the parent (Figure 2, Row 3). The correlation is not significantly negative when the adult child lives abroad (Figure 2, Row 3). For members of the extended family, the results show a significant negative association between the increase in distance to the father dyad and refugee mental health (Figure 2, Row 6).

Figure 2: Association of geographic location of family role relations and refugee mental health (regression coefficients and confidence intervals). [a] [b] [c]
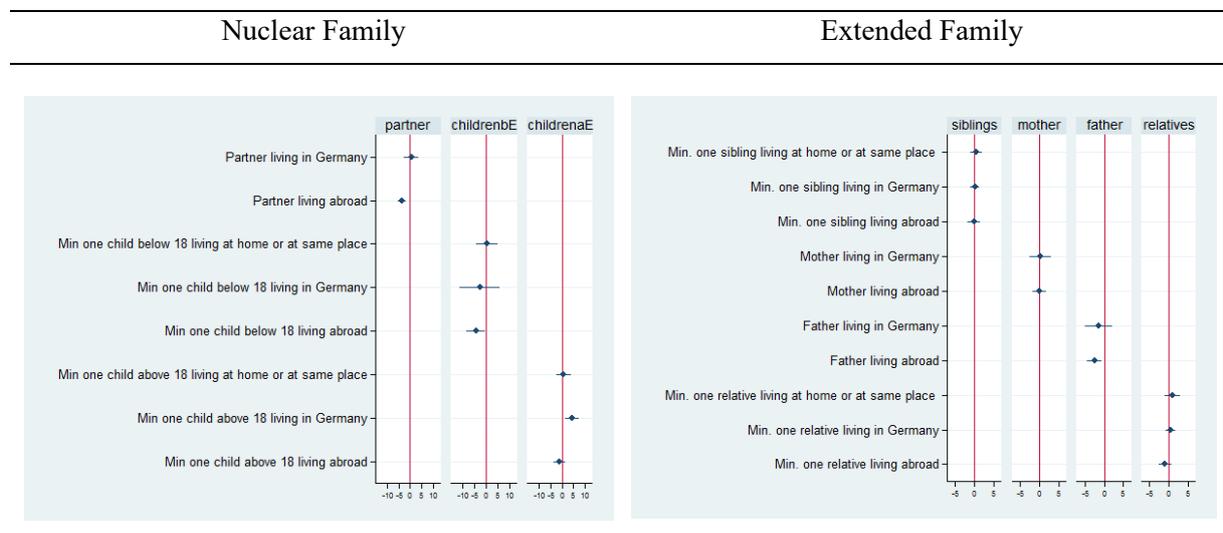
[a] The regressions control for socio-economic circumstances as well as for pre-, peri-, and post-migration stressors as listed in Table A2.
[b] Weighted results.
[c] For number of observations per regression, consult Table A3. The regressions only include those individuals who report ties to a certain role relation. Reference category for the dyadic relations of parents and partner: Individual at home or at the same locality.

5.   Discussion

The aim of this paper was to examine whether refugees' family networks are a protective factor for mental health after migration. Given the importance of mental health for integration, identifying resources within refugee communities that can promote this process is of substantial policy interest. Using representative data from the IAB-BAMF-SOEP Survey of Refugees in 2016, I examined structural aspects of family network size as well as the relational aspect of family composition and how these

features support life after arrival in the host country. As refugee migration often goes hand in hand with family separation, I additionally tested how dispersion of the nuclear family and distance from family affect mental health. In doing so, I combined the investigation of social networks with considerations from migration and mental health research.

First, I looked at family network structure and its direct relationship with refugee mental health. The hypothesis that network structure affects mental health was initially tested by Cohen and Wills (1985) and confirmed by Kawachi and Berkman (2001). I examined this finding for the special case of refugees living in a new host country. The average size of a refugee's nuclear family in Germany is 1.6 members, much smaller than household sizes in these individuals' countries of origin. Since the refugees who arrived in Germany between 2013 and 2016 are relatively young, they are only starting to found their own families. This phenomenon might explain the relative importance of nuclear family size compared to extended family network size. Once a refugee has a partner or children, he or she is less isolated, receives more support (Busch Nsonwu et al., 2013), and has more reasons to actively engage with the new environment (Weine et al., 2004). The insignificance of the association between extended family size and mental health found here might be due to the importance of relational aspects of migrant networks for social support as opposed to structural aspects, as shown by Herz (2015). Furthermore, the large variation in extended family size for refugees in Germany may have rendered associations with mental health undetectable. A small network of well-functioning ties might be more beneficial for mental health than a larger network in which optimal support cannot be provided (Wellman and Frank, 2000). Hence, the question arises who exactly in the kinship network is of relevance for refugee mental health.

To answer this question, I analyzed the different kinship role relations of refugees and their association with mental health in a second step. By investigating the composition of social networks, I build on the work of Beiser and Hou (2017), who showed that having a partner and children is positively related to refugee mental health. I followed the literature in using a partner or spouse as a proxy indicator of social support. Furthermore, as reported in numerous ethnographic studies, I assumed that children give life meaning for parents in exile (Weine et al., 2004) and thus act as a potential facilitator of mental health.

My findings show that adult children show a positive significant association with refugee mental health, in line with previous research on the parent-child bond in general (Wellman and Wortley, 1990, 1989) and on resource flows between generations in the migration context in particular (Busch Nsonwu et al., 2013). I also find that the father serves as important supportive role relation for mental health, comparable to findings on same-sex parent-child bonds in other groups (Wellman and Wortley (1990). The importance of fathers in this refugee population may, however, be due in part to the predominance of males among refugees who came to Germany between 2013 and 2016. My results show no significant association between having siblings or other relatives and mental health, however. This might be an artifact of the small variation in having siblings as well as the large variation in network size that is not covered when asking whether respondents have at least one other relative. Finally, the importance of extended family members in the context of improving mental health might not be adequately accounted for when using a compositional approach, as suggested by the contrast between these results and ethnographic accounts on refugee family life (Lewis, 2008; McMichael & Manderson, 2004; Weine et al., 2004; Whittaker et al., 2005). Intergenerational ties prove here to be the most important relationships in refugee mental health: fathers for young refugees and adult children for older refugees.

Third, my findings show the direct negative consequences of family separation for refugee mental health. By including detailed network information on family members' geographic distance to the refugee in Germany to a multivariate stressor model, the present analysis adds depth to the existing literature on family separation and refugee mental health (Nickerson et al., 2010; Schweitzer et al., 2006). A refugee whose entire nuclear family lives abroad is more likely to experience languishing mental health than a refugee who is living with all members of his or her nuclear family. This is in line with Nickerson et al. (2010) and Schweitzer et al. (2006), who show that fear of family being harmed in the country of origin and family separation are significantly related to increases in PTDS symptoms. Moreover, the decomposition of the refugee family network by role relation and family separation once again identifies the spouse, children, and father as important role relations and their absence as detrimental for mental health. Having these family members somewhere else in Germany generally does not show any significant association with mental health. Only adult children living elsewhere in

Germany exert a positive significant influence on parents' mental health. As many children in non-Western family contexts live with their parents until they found their own families, this finding may suggest that separation from parents equates with a loss of what would otherwise be pooled resources, as suggested by Busch Nsonwu et al. (2013). Adult children might be able to provide support to their parents, however (Wellman and Wortley, 1990), even when living in proximity to but not in the same locality as their parents. The mechanisms behind the negative outcomes after family separation identified here are likely manifold, including influences of altered network support and various psychosocial dynamics (Berkman et al., 2000). Violence, hunger, and loss can collectively traumatize families, thus weakening social support within existing network structures. Geographic distance might make it more difficult to access social support from these networks. In addition, fears of family being harmed abroad is a particular source of stress (Nickerson et al., 2010).

Apart from family separation, other migration stressors have a similarly negative and significant relationship with refugee mental health, confirmed by this study. Being female exhibits a large negative association. This mental health gradient by gender, with women as the more vulnerable sex, has been observed in other studies on refugees as well (Ahern et al., 2004; Cheung and Phillimore, 2018; Schweitzer et al., 2006; Steel et al., 2006, 2002). Moreover, a greater number of reasons to flee the country of origin is associated with significant decreases in MCS, in line with previous studies on refugee mental health (Priebe Kucukalic et al., 2012; Silove et al., 1997). The results also show a country of origin effect on mental health, with Afghans being especially vulnerable to mental ill health. One possible reason might be the frequent change in treatment of Afghan applications for asylum in Germany and the persisting unrest in the home country.

The present study has some limitations with implications for the analysis. First, as a household survey, the data is not collected for research beyond the egocentric network. Whole networks and their structural properties such as network density cannot be analyzed using the IAB-BAMF-SOEP data. Second, the first wave of the survey only provides information on structural and relational features of refugee social networks. The functional role remains a matter of interpretation. Actual or perceived social support is not observed. Looking at social support would allow for a direct study of the flow of different resources

in the national and transnational refugee family network. Social support indicators also allow for the testing of the so- called buffering hypothesis, an interaction effect between network structure and function (Cohen and Wills, 1985). Third, the paper analyzes refugee family networks and their association with mental health in a cross-sectional setting. Hence, the study cannot make causal inferences. As family members often feel obliged to help each other, I argue that reverse causality is weaker among these role relations (Thoits, 2011; Wellman and Wortley, 1989). Fourth, it is unknown whether family members died before or during migration, changing family size during migration. To compensate, I controlled for the death of members in the nuclear family. Last, I did not examine the mental health of (unaccompanied) minors, as this vulnerable group is not interviewed in the IAB-BAMF-SOEP Survey of Refugees.

Research can take meaningful next steps to improve knowledge on refugee social networks and their associations with mental health. Information on social support and longitudinal data can enhance our understanding of the changes in the refugee social network, support provided, and consequences for mental health over a longer period in the host country. Furthermore, to gain a better understanding of refugee mental health, friendship ties and acquaintances should be studied as potentially supportive relationships within the broader social network. The combination of knowledge on structural and functional forms of refugee social networks is an especially important mapping process (Agneessens et al., 2006). It yields the development of mental health intervention strategies such as support groups, family counseling, and mentoring programs.

The results from this analysis lead me to conclude that the definition of who counts as important person in a refugee family network goes beyond the definition of the nuclear family used in the German legal system. Under current German legislation, the spouse, minor children, and parents of minors can move to Germany within the framework of family reunification programs.[25] This policy hinders reunification of adult children and parents, ties whose separation are identified in this paper as the most distressing. Considering recent calculations by the IAB, it is likely that the applications for family reunification in

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[25] Family asylum is regulated by Section 26 of the Asylum Act (AsylG). The new regulatory framework for family reunification was approved by the German Bundestag on June 15, 2018 (Deutscher Bundestag, 2018a, 2018b, 2018c).

Germany will remain below expected numbers (Brücker, 2017). Hence, it is advisable to approve cases of family reunification outside the nuclear family as defined in the German context. Such a policy change has the potential to strengthen refugee support networks, improving both mental health and overall integration into German society.

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7. Appendix

Table A 1: Deletion of missing observations before analysis.

Deletion step	Retained N	% of initial sample
Initial sample size	4456	100
Working sample size	4332	100
Deletion of missing observations in dependent variables	3929	90.7
Deletion of missing observations in control variables	3568	82.36
Deletion of missing observations in network variables	3400	78.49

Table A 2: Sample size (unweighted) of linear regression models.

Table/ Figure No.	Model	N	R^2
Table 4	Model 1	3400	0.072
	Model 2	3400	0.069
Figure 1	Model 1 (Partner)	3400	0.071
	Model 2 (Child below eighteen)	3400	0.070
	Model 3 (Child above eighteen)	3400	0.070
	Model 4 (Siblings)	3400	0.070
	Model 5 (Father)	3400	0.074
	Model 6 (Mother)	3400	0.070
	Model 7 (other relatives)	3400	0.075
Table 5	Model 1	2543	0.090
Figure 2	Model 1 (Partner)	2393	0.085
	Model 2 (Child below eighteen)	2017	0.095
	Model 3 (Child above eighteen)	471	0.232
	Model 4 (Siblings)	3243	0.068
	Model 5 (Father)	2036	0.077
	Model 6 (Mother)	2670	0.067
	Model 7 (other relatives)	2135	0.111

Table A 3: Items used to illicit information on family network size, role relations and geographic dispersion/ distance of refugees living in Germany (TNS Infratest Sozialforschung, 2016).

Spouse/ Partner	
What is your marital status?	Single, I have never been married / Married / Registered partnership / Divorced / Terminated registered partnership/ Widowed / Partner from registered partnership is deceased / No details
Where does your spouse live?	Here in my household / in this accommodation In this town/location but in a different household/accommodation Elsewhere in Germany In my country of origin Elsewhere abroad No details
Do you currently have a partner	
Where does your partner live?	Here in my household / in this accommodation In this town/location but in a different household/accommodation Elsewhere in Germany In my country of origin Elsewhere abroad No details

Siblings	
Do you have any brothers or sisters?	
How many brothers and/or sisters (including half-brothers & half-sisters) do you have?	
Where do your brothers &/or sisters live? (Multiple answers possible)	Please select all responses that apply. Here in my household / in this accommodation In this town/location but in a different household/accommodation Elsewhere in Germany In my country of origin Elsewhere abroad

Children (for up to 8 children)	
Now we have a few questions about your children. If you have several children, please start with the oldest, then the second oldest and so on. The questions are asked for a maximum of 8 children.	Where does this child currently live? Here in my household / in this accommodation In this town/location but in a different household/accommodation Elsewhere in Germany In my country of origin Elsewhere abroad This child is deceased No details
In what year was your (…) child born?	

Parents (for mother and father individually)	

Where does your mother/ father currently live?	Here in my household / in this accommodation
	In this town/location but in a different household/accommodation
	Elsewhere in Germany
	In my country of origin
	Elsewhere abroad
	My mother/ father is deceased
	No details

Other relatives	
How many relatives do you have with whom you are normally in close contact?	
Where do these relatives currently live? (Multiple answers possible)	Please select all responses that apply.
	Here in my household / in this accommodation
	In this town/location but in a different household/accommodation
	Elsewhere in Germany
	In my country of origin
	Elsewhere abroad
	No details

Table A 4: Survey item on reasons of migration.

What were the main reasons that made you then leave this country?
Expulsion or deportation
Persecution
Discrimination (ethnic, religious, etc.)
Poor personal living conditions
The country's general economic situation
I wanted to move to where my family members were
My family sent me
Because family members had left this country
Because friends/acquaintances had left this country
Other reasons
No details

Table A 5: Descriptive statistics of other control variables. [a]

	mean	sd	min	max
Controls				
Age (Ref. 18-25years)	0.353	0.478	0	1
26-35 years	0.381	0.486	0	1
36-45 years	0.163	0.370	0	1
>46-55 years	0.103	0.304	0	1
Sex (Ref. male)	0.745	0.436	0	1
Female	0.255	0.436	0	1
ISCED (Ref. Less than primary education/ No school)	0.173	0.378	0	1
Primary education	0.201	0.401	0	1
Lower secondary education	0.172	0.378	0	1
Upper secondary education	0.280	0.449	0	1
Post-secondary non-tertiary education	0.043	0.204	0	1
Bachelor's/ Master's or equivalent level	0.119	0.324	0	1
Doctoral or equivalent level	0.011	0.105	0	1
Pre-Migration Stressors				
Number of reasons for migration	3.037	1.904	0	11
Migration Stressors				
Time traveling to Germany (Ref. one day)	0.119	0.324	0	1
Below one month	0.561	0.496	0	1
Up to half a year	0.252	0.434	0	1
One and more years	0.067	0.250	0	1
Post-Migration Stressors				
Type of accommodation (Ref. private)	0.546	0.498	0	1
Shared	0.454	0.498	0	1
Status (Ref. Recognized)	0.451	0.498	0	1
In Process	0.405	0.491	0	1
Tolerance Permit	0.082	0.274	0	1
Other	0.061	0.240	0	1
Savings (Ref. Yes)	0.073	0.260	0	1
No	0.927	0.260	0	1
Employed (Ref. Yes)	0.123	0.329	0	1
No	0.877	0.329	0	1
Year since arrival	1.241	0.672	0	3
Member of the nuclear family has died	0.023	0.149	0	1

[a] Weighted results

Table A 6: Descriptive statistics on number of family members per role relation. [a]

	mean	sd	min	max
Partner/spouse	0.521	0.499	0	1
Number of child below age 18	0. 903	1. 358	0	8
Number of child above age 18	0. 241	0. 921	0	8
Number of siblings	4.834	3.274	0	35
Father	0. 631	0. 482	0	1
Mother	0. 812	0. 390	0	1
Number of other relatives	8.23	15.305	0	99

[a] Weighted results

CHAPTER 4

The change in spatial distribution: refugee family reunification

Waiting for kin: a longitudinal study of family reunification and refugee mental health in Germany

Abstract

Involuntarily or planned – many refugees flee their home country alone, leave behind spouses and children but also siblings, parents, and other family members they otherwise care for. Reunification in hosting communities is difficult, as governments limit institutional family reunifications and the individual journey of kin is dangerous and often illegal. Having family abroad is mentally distressing for refugees, as kin might not live in safety. Additionally, reuniting with family members can be a source of support in the new environment. Grounded in theories of mental distress and social support, this analysis investigates the association between family reunifications and refugee mental health in a random sample of refugees in Germany (N = 6610), the IAB-BAMF-SOEP Survey of Refugees 2016 – 2018. By means of panel fixed-effect regression analysis, we observe institutionally sponsored but also individual moves of other family members. The study finds that family reunification has a positive association with refugee mental health, though not at an equally increasing rate for each additional member of the family. Gender differences show in the size of association, yet significant heterogeneous associations between refugee men and women cannot be observed. Finally, the associations are larger when only observing reunifications with the nuclear family.

1. Introduction

Family unity is enshrined in various human rights laws. Still, it has been subject to debates, resulting from the large influx of refugees to Europe in 2015. Public attention often rests with the costs of offering refuge and to extend it to family members (von Hermanni & Neumann, 2019). The discourse frequently results in restricted family reunification policies for refugees, with a punitive character for those seeking asylum (Bélanger & Candiz, 2019). Germany, for instance, has suspended family reunification for individuals with subsidiary refugee protection from 2016 to 2018 and restricted it by quota from 2018 onwards. Some countries like Canada or Australia provide resettlement programs in which entire families can seek asylum. However, capacities are limited. Hence, seeking asylum outside of resettlement programs is more common but frequently leads to one family member migrating first (Kraus, Sauer, & Wenzel, 2019). Family reunification at a later point becomes difficult to realise. Besides applying for institutionally assisted family reunification, a second means to reunite with the family is to join others in a host country and apply for asylum on own initiative. Recent research points towards increased mental strain as a result of prolonged family separation (Löbel, 2020). However, there is no empirical work on the question of whether family reunification can improve the mental health of refugees.[26]

Building on the notion of family as a social resource, we fill this gap by estimating the association of reuniting with family members in the host community on the mental health of refugees. Previous research indicates that the existence of a nuclear family[27] promotes mental health of this vulnerable group (Beiser & Hou, 2017; Löbel, 2020). In turn, good mental health has been identified as one crucial factor for other refugee integration trajectories (Ager & Strang, 2008; Berry, 1998). At the same time, family separation is one of the most obvious stressors to refugees' mental health (Löbel, 2020; Nickerson, Bryant, Steel, Silove, & Brooks, 2010). Separation takes place involuntarily during

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[26] We define mental health as a continuum from languishing to flourishing in congruence with Keyes (2002) and the definition of the World Health Organization (WHO, 2014).
[27] Despite its clarity on family unity, international law is missing a universal definition of the term "family". The increasing body of academic work and many legal rulings however point to the definition of a family as the "nuclear" family, meaning spouses and their children.

evacuation or occurs premeditated to increase successful resettlement by sending the most agile and strongest person. Therefore, the act of leaving behind family in the case of refugee migration differs from other migrants (Honohan, 2009). Moreover, not only are refugees arriving in the host country more vulnerable than other migrants who entered the country with a valid residence permit. Those arriving need additional resources and care (Ryan, Dooley, & Benson, 2008), which family members can provide.

Investigating changes in mental health of refugees over time, we employ data of the IAB-BAMF-SOEP Survey or Refugees. This nationwide random sample of asylum seeker and refugees in Germany comprises refugees who immigrated during the years 2013–2016. The analysis looks at family reunification through legal channels and through individual effort to have other family members move to the same destination. By means of fixed-effects regression analyses with data from 2016–2018 (N = 6610), we show family reunification with members of the (nuclear) family has a significant and positive association with refugee mental health, though not at an equally increasing rate per reunification. Our analyses suggest that women as well as men profit from family reunification. Our research has important implications for research and policymaking. From a research perspective, we highlight the need to investigate the resource mobilisation of refugees, seeing vulnerable groups as active agents who make use of social resources when being equipped with them. Second, we particularly address gender differences in refugee integration trajectories, a dimension often neglected though having a large impact on how to increase livelihoods of this vulnerable group in practice.

2. Refugee mental health – the role of pre-, peri- and post-migration stressors

Experiences of forced migration leave many refugees with mental health impairments. Accordingly, refugees suffer from languishing mental health to a higher extent than members of the host society (Fazel, Wheeler, & Danesh, 2005; Lindert, Von Ehrenstein, Priebe Kucukalic, & Mielck, 2009). This is also true in the German context where mental health of refugees is persistently lower than in the host population, though slowly increasing over time (Brücker et al., 2019; Metzing, Schacht, & Scherz,

2020). The finding comes as no surprise, considering the resource loss refugees endure before, during and after their resettlement (Ryan et al., 2008). This vulnerability reproduces also in other integration trajectories, showing that mental health is for instance an important mediator for finding employment among refugees (Bakker, Dagevos, & Engbersen, 2014).

Most prominently, psychiatric studies track prevalence rates of mental health issues among refugees as well as their determinants. This research tradition has placed an emphasis on the precarious situation in the countries of origin and pre-migration stressors such as undue detention and torture (Steel et al., 2009, 2006). Pre-migration trauma inflicted through exposure to war and torture persists over time and affects the long-term mental health of refugees (Steel et al., 2009, 2006). Additionally, there is another angle in refugee mental health research, focusing on the pressing needs of refugees in transit and in host communities (Beiser & Hou, 2017; Heptinstall et al., 2004; Lau et al., 2018; Li, Liddell, & Nickerson, 2016; Nickerson et al., 2010; Ryan et al., 2008; Steel, Silove, Phan, & Auman, 2002; Walther, Fuchs, Schupp, & von Scheve, 2020; Walther, Kröger, et al., 2020). These studies analyse post-migration stressors and living difficulties that add to the already stressing situation preceding migration. As an example, studies find that living in shared accommodation and having an unsafe asylum status affects refugee mental health negatively (Walther, Fuchs, et al., 2020).

One development on the crossroads of sociology and health research should receive increased scientific attention: the discussion on how resources aid integration and particularly mental health outcomes of refugees. Ryan, Dooley and Benson have sensitised for the potential resources refugees have following resettlement (Ryan et al., 2008). Based on Hobfolls' conservation of resource theory (Hobfoll, 2001), the authors discuss how resources are accessible and inaccessible to refugees in the aftermath of migration. Either inaccessibility is self-inflicted through believes or individual vulnerabilities hinder access. Inaccessibility is also the outcome of environmental factors such as institutional barriers. In our analysis, we focus particularly on one resource that is potentially available to refugees: kin. Even if refugee families separate, there is the possibility to reunite as enshrined in human rights law.

Article 16 of the Universal Declaration of Human Rights first laid down family unity as a human right. Since then, other legal instruments have also recognised this right (see Appendix, section 1.1). Derived

from this assertion of the right to family unity, the 1951 Convention Relating to the Status of Refugees equally confirmed family unity for refugees. Family unity entails two obligations for nation states. First, states should refrain from any action that separates families. Second, states must take measures as to ensure separated families can reunite. Therefore, states generally have mechanisms in place to reunite refugees with family members, in work-related situations but also in the case of refuge (see Appendix, section 1.3). Nevertheless, not only laws govern family reunification opportunities for refugees. Many reunifications are the consequence of individual effort of family members to seek asylum in the same country as other family members. The act of family reunification from a holistic perspective is thus not bound to the act of resettlement but entails all means of moving to the same country as other family members. Hence, this analysis does not limit itself to count family reunifications of refugees taken by means of official resettlement. The analysis correspondingly also includes family reunifications who come about by having family members move to the same country by means of own planning and ability.

2.1 Overcoming mental health languishing: family as social resource

The human right of family unity indirectly underscores that the family is a potential social resource. Kinship networks not only provide affirmation of the self but offer an identity as well as tangible support (Agneessens, Waege, & Lievens, 2006; Bilecen & Cardona, 2018; Sapin, Widmer, & Iglesias, 2016; Thoits, 2011). This support among refugees and particularly the family is necessary to appraise acculturative stress. Qualitative interviews provide insights on the aftermath of forced resettlement: children provide care for their elderly parents (Busch Nsonwu, Busch-Armendariz, Cook Heffron, Mahapatra, & Fong, 2013) and a sense of duty and purpose to build a new life (Weine et al., 2004). Partners, siblings, and other family members support one another on a range of occasions such as finding employment, understanding the tasks to structure life and to enjoy leisure time (Boyd, 1989). In the context of refugee migration, family facilitates the capability to engage in the new environment (Goodson & Phillimore, 2008; Honohan, 2009). At the same time, family at least in the beginning of a stressful situation, helps avoiding social isolation (Honohan, 2009). Particularly when family members have experienced similar atrocities, they can associate with the painful experience of other family

members and provide tailored guidance to alleviate stress (Thoits, 2011). The bonds to family members hence create trust in the new environment (Strang & Quinn, 2019). From social network theory we know the larger the support network of particularly the family, the more potential resources exist (Thoits, 2011), with positive implications for refugee mental health (Löbel, 2020). Saying this, family separation affects refugee mental health negatively in the aftermath of resettlement. Particularly separation from the nuclear family poses a threat to refugee mental health (Löbel, 2020).

Besides the supportive aspect of the family, another facet is important when analyzing the potential benefits of family reunification after refuge. Family members left behind remain in war zones or in transit, a dangerous situation that those living in a safe environment must endure. Hence, refugees commonly report fear for their family living abroad (Choummanivong, Poole, & Cooper, 2014; Nickerson et al., 2010), a determinant for their mental health languishing in host communities. Bringing family members into the host country of residence can alleviate refugees already residing in safety from the stress of thinking about family members being in danger. Many refugees aim and plan for reunifying with family members in the host community.

Referring to the discussed literature, we see two arguments for an association between family reunification and refugee mental health. First, refugees who seek to reunite with their family often must fear for the family left behind. This fear will not stop, if only one of multiple family members successfully relocates. Additionally, regarding the argument of potential support within social network structures, the size of the reunited family support network is presumably crucial as well. Thus, taking these considerations together leads us to the following hypotheses:

H_1: Reunifying refugees who already reside in a host country with members of the nuclear family from abroad has a positive influence on their mental health. This association increases with additional family members who move to the same country.

The distinction between nuclear and non-nuclear family is important to gain insights on whether family reunification as such or only the reunification with close family members unfolds social support and a reduced fear of danger. Hence, we differentiate between reunifications with the nuclear family and

reunifications including other family members, in case of this analysis to siblings as refugees in the sample provide information on their move:

H₂: The association between family reunification and refugee mental health is not as pronounced when including siblings in the group of reunifying individuals, given the prime importance of the nuclear family.

2.2 The vulnerability of female refugees

It is worth looking into gendered vulnerabilities and resource mobilization. First, gender-based violence and sexual violence are a risk that women are more likely to endure during conflict compared to men (Nawyn, Reosti, & Gjokaj, 2009). In many ways, it is a tool of war which has been repeatedly used in the contexts of colonialization and genocide (Burnett & Peel, 2001). Such vulnerability increases the risk of languishing mental health in female refugees (Walther, Fuchs, et al., 2020). Second, refugee women often experience inequalities in other domains of daily life that lie outside of the horrors of war and persecution. Research has shown that female refugees are less educated than their male counterparts and are less likely to have gainful employment prior to refuge (Burnett & Peel, 2001).

These constrains in capability also express themselves as inequalities in the host community. Female refugees report lower language proficiency (Beiser & Hou, 2017; Cheung & Phillimore, 2017), a challenge derived from gendered education deficits in the home country but also gender-based care duties that persist in the host communities (Lenette, Brough, & Cox, 2013). Even when female refugees participate in language training and qualifying educational measures in the new environment, they still do not find their way into gainful employment as often as male refugees (Cheung & Phillimore, 2017). Across the EU, in 2014, only 45% of refugee women were in employment, well below the outcomes of both other immigrant women and refugee men (Dumont, Liebig, Peschner, Tanay, & Xenogiani, 2016). Also in Germany, data shows that refugee women have a much lower probability to move into gainful employment, amounting to a gap of 10 percentage points compared to male refugees (Jacobsen, Krieger, & Legewie, 2020). With this burden, they are in particularly need for other family members to take care

of financial matters and administrative choices. Moreover, female refugees as part of religious practices are often fulfilling the traditional role of the caregiver within the home and are less likely to culturally adapt to host community customs (Ozyurt, 2013). The cultural background also explains non-take up of employment in the host-communities, most likely because of family- oriented lifestyles already present in the home countries of the refugees (Bakker, Dagevos, & Engbersen, 2017). All in all, being left alone with childcare responsibilities and the inability to access knowledge in the languages needed, women are less likely to seek help in accessing resources needed for further integration and well-being (Goodson & Phillimore, 2008). The lack of resources outside the family might be compensated by social resources within the family.

Qualitative studies provide first insight into the correlation family reunification has on female refugees compared to male refugees (Wachter, Cook Heffron, Snyder, Busch Nsonwu, & Bridget Busch-Armendariz, 2016). In general, the family unit serves as a prominent source of social support. While refugee men are more likely to develop social networks around employment and access further resources through these networks, female refugees look for resources in their vicinity, in schools and at home (Goodson & Phillimore, 2008). Given that female refugees not only connect with different networks than men, for instance rather in the private than in the public sphere, this also has consequences for the resources they have access to post-migration (Cheung & Phillimore, 2013). Hence, women who migrate alone to seek refuge have fewer personal resources to start with and profit more from family reunification than men, also in terms of mental health. A lack of social resources has already shown to have a detrimental influence on refugee women's mental health (Porter & Haslam, 2005). Hence, we hypothesize

H_3: The positive association of family reunification and mental health is larger for female refugees compared to male refugees.

3. Methodology

3.1 Data

We employ data from the German IAB-BAMF-SOEP Survey of Refugees, a panel study of individuals who applied for asylum in Germany between 2013 and 2016 (Kühne, Jacobsen, & Kroh, 2019). The panel study is integrated in the German Socio-Economic Panel (SOEP) – a running panel study of households in Germany since 1984 (Goebel et al., 2019, 10.5684/soep-core.v35). We work with the first three survey years 2016–2018. The sampling of the survey followed a multi-stage disproportional stratified sampling. It ensures a large enough coverage of female refugees, the elderly and refugee families amid the large influx of young male refugees. The first wave response rate amounts to roughly 50%, whereas panel retention between each consecutive wave is about 66% each year. All interviews make use of CAPI mode. Questionnaires are available in German, English, Urdu, Farsi/Dari, Arabic, Pashto and Kurmanji (Jacobsen, 2019).

3.2 Variables

Dependent variable – Refugees' mental health is measured with the Short Form Health Survey (SF-12) and the derived Mental Health Component Summary Scale (MCS) in the SOEP (Ware, Kosinski, & Keller, 1996). The SOEP provides the MCS as part of the health-related generated variables. Its scale ranges from 0–100, a continuum from mental health languishing to flourishing, and its mean represents the average mental health of the German population in 2004 (Andersen, Mühlbach, Nübling, Schupp, & Wagner, 2007; Tibubos & Kröger, 2020). The item inventory used to derive the MCS refers to symptoms known from depressiveness and anxiety, additionally to social deficiencies from mental health problems. The MCS is surveyed every second year and at the first interview when becoming a SOEP participant. This cycle has implications for the frequency of the MCS being available for analysis. The outcome is available in every respondents' year of the first interview and in 2018. Thus, for respondents of the initial survey, the MCS is available in 2016 and 2018. For respondents, who entered the survey in 2017 the MCS is available in the years 2017 and 2018 (Appendix Table A4).

Independent Variables – We measure the association family reunification has on refugee mental health discretely as the number of reunifications having taken place. One specification entails the sum of nuclear family (partner, spouse, and children only) and another a variation further includes siblings. In order to identify non-linear associations, the squared term of the variables is employed as well.

For both measures, we use the information on family reunification of partners, spouses, siblings, and children provided in the 2018 IAB-BAMF-SOEP Survey of Refugees.[28] This definition of family reunification only entails that members have moved to Germany and not necessarily into the household. In 2018, respondents provide details on the family members who moved to Germany after respondents arrived themselves. Information includes the month and the year of each family member moving. In a couple of cases, migration information on month-level is missing (N = 123). In those instances, we chose to impute the month randomly because we have no indication that the missing month (when year is available) correlates with our outcome variable or the independent variables.

Control variables – As the SOEP provides information on family reunifications before first interview, we control for the time from the first reunification to the time respondents report the MCS for the first time. The information accounts for a potential decreasing association of family reunification on mental health over time. Those, who never experience family reunification or only experience it after the first interview in the survey, receive a 0 on this control variable. Other than that, the models also control for time varying and refugee-specific factors equally confounding refugee mental health and family reunification. We first include information on the housing arrangements (0 = private accommodation, 1 = shared accommodation), as a post-migration stressor in form of insufficient housing (Walther, Kröger, et al., 2020). Second, we include language proficiency (a categorical variable across speaking, reading and writing German: 1 = no or little knowledge, 2 = some knowledge 3 = good as well as very good knowledge) to account for limited help-seeking behavior following German language insufficiency (Kang et al., 2010). Having employment alleviates the mental strain of lacking sufficient financial resources, a known correlate of mental health languishing (Bartley, 1994; McKee-Ryan, Song,

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[28] As a robustness check, we also include siblings (see Online Appendix, section 3.1). Unfortunately, the SOEP survey does not ask the exact arrival date of parents and other family members moving to Germany. We therefore do not include them in the analyses.

Wanberg, & Kinicki, 2005; Ryan et al., 2008). Hence, models control for employment, including apprenticeships and traineeships (0 = not employed, 1 = employed). The next three variables control for other social resources next to the bonding family network of refugees, in their supportive role for mental health (Kawachi & Berkman, 2001; Thoits, 2011). We control for the social support as the frequency with which refugees meet individuals holding the same nationality as well as with German nationals (1 = never, 2 = seldom, 3 = regularly, 4 = often). For the same reason, we control for the absolute number of people with a migration background in zip code 8 area (PLZ8, close neighborhood) provided by the enterprise MICROM. This data can be linked to the SOEP (for an overview see Goebel et al. 2014). Sixth, knowing about the potential confounding of physical and mental health (Ohrnberger, Fichera, & Sutton, 2017), the physical health component summary scale (PCS) is part of the model specification, measuring physical health on a scale from 1 to 100. Seventh, in order to control for the institutional knowledge refugees gain over the years and serving as a proxy for access to support as well, we include a variable showing participation across a range of integration courses, coded as a dummy variable (0 = no participation, 1 = participation). Last, we summarize asylum status (1 = in process, 2 = accepted meaning 1–3 years residence title, 3 = rejected, including ban on deportation), another strain in the aftermath of resettlement (Steel et al., 2006).[29]

For descriptive purposes, we also present the countries of origin, age in categories, gender, family status, having children and education – all time invariant or relatively stable over time and not included in the regression analysis. Countries of origin are categorized (1 = Syria, 2 = Iraq, 3 = Afghanistan, 4 = Iran / Pakistan, 5 = Eritrea / Somalia, 6 = others). The age information is grouped (1 = age 18–25, 2 = age 26–35, 3 = age 36–45 and 4 = age +46). We provide information on being married (0 = single, 1 = in partnership) and having children (0 = no children, 1 = children). Gender is a binary variable (0 = male and 1 = female). The International Standard Classification of Education (ISCED) presents education attainment (1 = primary education attainment which includes also having no education certificate yet, 2 = secondary education attained, 3 = tertiary education attained).

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[29] We impute missing values by using information on asylum status from the years before, if possible.

3.3 Sample specification

We consider survey years 2016–2018 for analysis, enclosing N = 14,363 person-years. Table 1 summarizes the sample restrictions applied. As these person-years also include individuals who only participate once, we drop these cases for our fixed-effect regression analysis (retained N = 11,131). Further, we exclude individuals with missing values on our dependent variable (retained N = 8182). We equally apply listwise deletion in the independent variables of interest (retained N = 8114). Further, given that we observe the MCS only twice per person across three years, this diminishes the sample size. Respondents as part of the survey in 2016 have three person years, with no measurement of the MCS in 2017. This leads to the exclusion of their second person-year (retained N = 6610). As a robustness check, one sample specification restricts to those having a nuclear family to reunite with (retained N = 5118).

Table 1: Sample restrictions

	Retained N for all three survey years jointly
Initial sample size IAB-BAMF-SOEP Survey of Refugees 2016, 2017, 2018	14.363
After deletion of individuals with only one survey answered	11.131
After deletion of individuals with missing values in dependent variable at least once (MCS)	8.182
After deletion of individuals with missing values in independent variables at least once	8.114
After deletion of individual years where no MCS was surveyed – Final unrestricted model	6.610
After deletion of individuals who do not have a nuclear family, including adult children – Final restricted model	5.118

3.4 Analytic strategy

We use a fixed-effects regression analysis with time and person fixed-effects. The analysis relates changes in mental health to the changes in time-varying covariates. Such a fixed- effects model denotes a function of

$$Y_{it} = \beta_1 reunification_{it} + \beta_2 x_{2it} \dots \beta_k x_{kit} + a_i + d_t + \varepsilon_{it},$$

where Y_{it} represents the estimated MCS for individual (i) at a certain time point (t), β_1 the association of family reunification with the MCS, $\beta_2, \dots, \beta_k$ the coefficients for the covariates, a_i the individual and d_t the time fixed-effects. ε_{it} is the error term.

Through demeaning with person-specific means, time constant error terms fall away and leave a within-estimator, providing the association between changes in the independent and dependent variable. The models account for time constant (unobserved) heterogeneity, such as family composition, ability, and motivation to reunite with family. This circumstance for instance also accounts for family status at time of arriving in Germany. Hence, the disproportionate sampling design of the IAB-BAMF-SOEP Survey of Refugees, amongst others overrepresenting families by oversampling children, is unlikely to bias our results. The sampling strategy entailed time constant variables only (gender, country of origin, age at the time of sampling and residence status at the time of sampling; (Kroh, Kühne, Jacobsen, Siegert, & Siegers, 2017)

4. Analysis

4.1 Descriptive statistics

Descriptive statistics in Table 2 provide information about who realizes family reunification in Germany within the group of recently arrived refugees (for a decomposition by gender, see Appendix Table A1). The population of refugees in Germany is relatively young. Refugees naturally experience family reunification much more often at an older age: 33% of individuals between 26 and 35 having

experienced family reunification com- pared to 12% in the group of younger refugees with age 18–25. Individuals who are married (89% of reunified individuals) and individuals with children (77% of reunified individuals) more often report reunification with kin. Moreover, men more often realize family reunification compared to women (58% of men vs. 42% of women). In total, 74% of individuals in the sample reunifying with family members are Syrian; 85% of refugees reporting family reunification are recognized as refugees, an indicator that from an institutional perspective these individuals have a higher chance to realize reunification with the help of the government. Overall, about 18% of the sample population have experience family reunification before the first interview, almost 7% experience it after the first interview (Appendix Table A2).

Table 2: Descriptive statistics of refugees who have and have not experienced family reunification (including siblings) across all survey years – Means and standard errors in parentheses.

Variable	No experience of family reunification	Experience of family reunification (incl. siblings)	Difference
MCS	48.214	49.506	1.292***
	(11.673)	(11.166)	(0.339)
Gender			
Male	0.635	0.580	-0.055***
	(0.481)	(0.494)	(0.014)
Female	0.365	0.420	0.055***
	(0.481)	(0.494)	(0.014)
Time from first reunification to first interview (in months)	0.000	29.869	29.869***
	(0.000)	(26.997)	(0.378)
Age			
18-25 years	0.267	0.121	-0.146***
	(0.442)	(0.327)	(0.012)
26-35 years	0.351	0.341	-0.010
	(0.477)	(0.474)	(0.014)
36-45 years	0.243	0.331	0.089***
	(0.429)	(0.471)	(0.013)
46+ years	0.140	0.207	0.067***
	(0.347)	(0.405)	(0.011)
Country of Origin			
Syria	0.530	0.737	0.206***
	(0.499)	(0.440)	(0.014)
Iraq	0.128	0.121	-0.008
	(0.335)	(0.326)	(0.010)
Afghanistan	0.131	0.048	-0.084***
	(0.338)	(0.213)	(0.009)
Iran/ Pakistan	0.051	0.017	-0.034***
	(0.219)	(0.128)	(0.006)

Eritrea/Somalia	0.061	0.032	-0.029***
	(0.240)	(0.177)	(0.007)
Serbia/Albania/Kosovo	0.012	0.005	-0.006**
	(0.108)	(0.073)	(0.003)
Others	0.086	0.040	-0.046***
	(0.280)	(0.197)	(0.008)
Year of immigration	2,014.832	2,014.801	-0.031
	(1.058)	(1.373)	(0.033)
Education			
Primary education	0.382	0.341	-0.041***
	(0.486)	(0.474)	(0.014)
Secondary education	0.390	0.394	0.004
	(0.488)	(0.489)	(0.014)
Tertiary education	0.175	0.201	0.026**
	(0.380)	(0.401)	(0.011)
Education – missing values	0.053	0.064	0.011*
	(0.224)	(0.245)	(0.007)
Family status			
Single	0.385	0.107	-0.279***
	(0.487)	(0.309)	(0.013)
Married	0.612	0.891	0.278***
	(0.487)	(0.312)	(0.013)
Family status – missing values	0.002	0.003	0.000
	(0.048)	(0.051)	(0.001)
Children			
No kids	0.449	0.232	-0.217***
	(0.497)	(0.422)	(0.014)
Kids	0.551	0.768	0.217***
	(0.497)	(0.422)	(0.014)
Employment			
Not employed	0.808	0.832	0.024**
	(0.394)	(0.374)	(0.011)
Employed	0.192	0.168	-0.024**
	(0.394)	(0.374)	(0.011)
Accommodation			
Private accommodation	0.718	0.867	0.148***
	(0.450)	(0.340)	(0.013)
Public accommodation	0.282	0.133	-0.148***
	(0.450)	(0.340)	(0.013)
Asylum status			
In process	0.211	0.123	-0.088***
	(0.408)	(0.328)	(0.011)
Recognised	0.734	0.852	0.118***
	(0.442)	(0.356)	(0.012)
Rejected	0.056	0.026	-0.030***
	(0.230)	(0.159)	(0.006)
German language skills			
Low	0.359	0.361	0.002
	(0.480)	(0.480)	(0.014)
Medium	0.342	0.353	0.011
	(0.475)	(0.478)	(0.014)
High	0.299	0.286	-0.013
	(0.458)	(0.452)	(0.013)

Meeting people with same nationality			
Never	0.112	0.113	0.001
	(0.315)	(0.316)	(0.009)
Seldom	0.234	0.254	0.020
	(0.423)	(0.435)	(0.012)
Regularly	0.222	0.266	0.045***
	(0.415)	(0.442)	(0.012)
Often	0.432	0.367	-0.065***
	(0.495)	(0.482)	(0.014)
Meeting German nationals			
Never	0.212	0.209	-0.002
	(0.408)	(0.407)	(0.012)
Seldom	0.210	0.256	0.047***
	(0.407)	(0.437)	(0.012)
Regularly	0.157	0.164	0.008
	(0.363)	(0.371)	(0.011)
Often	0.422	0.370	-0.052***
	(0.494)	(0.483)	(0.014)
Integration course			
No	0.345	0.340	-0.005
	(0.475)	(0.474)	(0.014)
Yes	0.655	0.660	0.005
	(0.475)	(0.474)	(0.014)
PCS	53.227	52.046	-1.181***
	(10.078)	(10.106)	(0.296)
Number of individuals with a migrations background in neighborhood	192.382	193.109	0.727
	(158.304)	(154.074)	(4.611)
Observations	5,101	1,509	6,610

4.2 Main findings

Models 1, 2 and 3 in Table 3 show the results of fixed-effect regression models. Mental health of refugees is regressed on time-varying post-migration integration factors of refugees, including the number of family members an individual reunified with. Particularly, Model 3 excludes refugees without a nuclear family or a life partner to reunite with, serving as a robustness check. It shows that the associations presented in Model 2 are not driven by single male refugees who might have different mental health outcomes.

Model 1 shows the association of an increase in the number of family members moving to Germany on refugee mental health, with no further sample restrictions applying. The count of family reunifications

includes siblings. The results show a non-significant association at any conventional significance level with a coefficient of 1.86 and standard error of 1.17. Model 2 uses the same unrestricted model and regresses mental health on a discrete variable of family reunification, only counting members of the nuclear family. The association is significant and initially large with an increase in MCS of 2.82 for one reunification taking place and an increase in MCS by 3.78 points with a second reunification taking place, considering the non-linearity of the association. To derive the association for each additional reunification, insert the coefficients in the denoted formula above. The association decreases to 2.88 in size for the third reunification onwards. The same applies to model 3. Saying this, the data only partially support hypothesis 1. Family reunification as an event is positively and significantly associated with refugee mental health. The non-linearity of the association points towards the conclusion that not each additional incident of family reunification at the same place of residence is equally associated with an increase in mental health outcome. Moreover, we accept hypothesis 2 stating that the association of family reunification on refugee mental health is smaller when accounting for extended family reunification, in form of siblings.

Table 3: Unstandardized coefficients and standard errors of the association of family reunification on refugee mental health

	Model 1 (full sample)	Model 2 (full sample)	Model 3 (restricted sample)
Number of reunifications with family, incl. siblings	1.86		
	(1.17)		
Number of reunifications with family, incl. siblings – squared	-0.14		
	(0.32)		
Time from interview until first reunification (incl. siblings)	-0.06		
	(0.05)		
Time from interview until first reunification – squared (incl. siblings)	0.00		
	(0.00)		
Number of reunifications with family, excl. siblings		3.75***	3.83***
		(1.32)	(1.37)
Number of reunifications with family, excl. siblings – squared		-0.93**	-0.97**
		(0.41)	(0.41)

Time from interview until first reunification (excl. siblings)		-0.07	-0.09*
		(0.05)	(0.05)
Time from interview until first reunification – squared (excl. siblings)		0.00	0.00
		(0.00)	(0.00)
Employment (Ref. unemployed)			
Employed	0.14	0.13	-0.65
	(0.56)	(0.56)	(0.71)
Housing (Ref. private)			
Shared accommodation	-1.45**	-1.40**	-2.21***
	(0.58)	(0.58)	(0.70)
Asylum status (Ref. in process)			
Asylum Status-Accepted	0.75	0.72	0.69
	(0.65)	(0.65)	(0.75)
Asylum Status-Rejected	-0.38	-0.38	0.83
	(1.01)	(1.01)	(1.23)
German knowledge (Ref. no knowledge)			
Some knowledge in German	-0.11	-0.11	0.07
	(0.51)	(0.51)	(0.57)
Good knowledge in German	0.45	0.46	0.78
	(0.66)	(0.66)	(0.76)
Meeting people of the same nationality (Ref. never)			
Seldom	-0.26	-0.25	0.02
	(0.66)	(0.66)	(0.71)
Regularly	-0.67	-0.65	-0.56
	(0.68)	(0.68)	(0.74)
Often	-1.03	-1.00	-0.58
	(0.67)	(0.67)	(0.74)
Meeting people of German nationality (Ref. never)			
Seldom	0.39	0.38	0.57
	(0.59)	(0.59)	(0.68)
Regularly	0.85	0.82	0.58
	(0.65)	(0.65)	(0.73)
Often	1.89***	1.89***	1.88***
	(0.60)	(0.60)	(0.69)
PCS	-0.27***	-0.27***	-0.26***
	(0.03)	(0.03)	(0.03)
Integration course (Ref. no)			
Integration course	0.21	0.22	0.11
	(0.41)	(0.41)	(0.49)
Number of migrants in neighborhood	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)

Survey year (ref. 2016)			
2017	-0.50	-0.48	-0.11
	(0.51)	(0.51)	(0.60)
2018	-0.01	0.03	0.51
	(0.44)	(0.42)	(0.49)
_cons	61.16***	61.23***	60.56***
	(1.68)	(1.67)	(1.85)
N	6610.00	6610.00	5118.00
Within subject standard deviation	9.81	9.81	9.80
Rho	0.49	0.49	0.50
R^2 - within	0.05	0.05	0.06
N of people at risk	0 = 5,101	0 = 5,437	0 = 3,945
(number of family reunifications in the sample)	1 = 902	1 = 783	1 = 783
	2 = 432	2 = 356	2 = 356
	3 = 83	3 = 15	3 = 15
	4 = 50	4 = 8	4 = 8
	5+ = 42	5+ = 19	5+ = 11

Standard errors in parentheses - * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.3 Heterogeneous association – gender

Table 4: Unstandardized coefficients and standard errors of the association of family reunification on refugee mental health, by gender

	Model 1 – Male (full sample)	Model 2 – Female (full sample)	Model 3 – Male (full sample)	Model 4 – Female (full sample)	Model 5 – Male (restricted sample)	Model 6 – Female (restricted sample)
Number of reunifications with family, incl. siblings	1.61	3.54				
	(1.28)	(2.32)				
Number of reunifications with family, incl. siblings – squared	-0.26	0.43				
	(0.31)	(0.57)				
Number of reunifications with family, excl. siblings			3.78**	5.36*	3.94**	5.08*
			(1.47)	(2.97)	(1.56)	(3.03)
Number of reunifications with family, excl. siblings – squared			-1.08**	-0.66	-1.15**	-0.61
			(0.46)	(0.65)	(0.49)	(0.65)
_cons	65.69***	54.73***	65.65***	54.84***	65.55***	54.66***
	(2.34)	(2.47)	(2.32)	(2.43)	(2.69)	(2.56)
N	4114.00	2496.00	4114.00	2496.00	2906.00	2212.00
Within subject standard deviation	9.76	9.83	9.75	9.85	9.81	9.70
Rho	0.47	0.55	0.48	0.54	0.49	0.54
R^2 - within	0.07	0.05	0.07	0.04	0.08	0.04
RMSE	6.86	6.89	6.85	6.91	6.64	6.73
N of people at risk (Number of family reunifications in the sample)	0 = 3,239 1 = 411 2 = 335 3 = 61 4 = 39 5+ = 29	0 = 1,862 1 = 491 2 = 97 3 = 22 4 = 11 5+ = 13	0 = 3,432 1 = 350 2 = 308 3 = 9 4 = 6 5+ = 9	0 = 2,005 1 = 433 2 = 48 3 = 6 4 = 2 5+ = 2	0 = 2,224 1 = 350 2 = 308 3 = 9 4 = 6 5+ = 9	0 = 1,721 1 = 433 2 = 48 3 = 6 4 = 2 5+ = 2

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Control variables: employment status, type of housing, asylum status, knowledge of the German language, meeting people of the same nationality and meeting people of German nationality as well as time from interview to first reunification, time from interview to first reunification squared, PCS, participation in integration courses, number of individuals with a migration background in the area and survey year. Model 1 and 2 are full models, model 3 is restricted to refugees that have a nuclear family.

Table 4 displays gender-specific associations between family members reuniting in Germany and refugee mental health. The first two gendered regression models are not restricted and include siblings in the family reunification count (Model 1 and Model 2). The other four models exclude siblings from the count. Models 5 and 6 restrict the sample towards refugees that have a nuclear family.

Accounting for reunifications including siblings, both associations with refugee mental health for men and women are insignificant (Models 1–2). At the same time, the within-group mean difference for both men and women increase for reunifications with the nuclear family (Models 3–6). Particularly men show a significant positive association between nuclear family reunification and mental health – even when restricting the model to respondents that are eligible for institutional family reunification. In congruence with the models in Table 3, the data does not support the hypothesis that an increase in family members reuniting is associated with an increase in mental health for each additional person, given the non-linearity of the association. Yet, experiencing the event once or twice has an increasingly positive correlation with refugee mental health. The difference in significance level of the coefficients between women and men might result from the limited number of reunifications in the group of female refugees (for the tabulation of reunifications see last rows in Table 4), particularly in the tails of the distribution. Overall, refugee women are more often married and have children (Appendix Table A1). Yet, they also more often arrive jointly in a host country and hence do not have the same potential for reunification compared to men. The coefficients for the variables of interest are large for women, particularly for the first and second family reunification taking place. Yet, the large standard errors point towards the larger uncertainty in this group under analysis, due to comparably small variance in the number of reunifications.

In order to identify whether the association for women is stronger than for men (as stated in hypothesis 3), we study whether the models hold the same explanatory power. Because the models are not nested, confidence intervals cannot be interpreted between models. The calculation of the root mean squared error (RMSE, see Table 4), equal in size across the gendered models, indicates similar explanatory power across gender. We additionally estimate the kernel density for the estimated MCS for each family reunification for men and women separately in order to determine whether our models predict higher

MCS for women compared to men. As Figures A1–A3 in the Appendix indicate that the models predict a higher MCS for refugee women, although only for a small proportion of the sample. Saying this, the analysis is inconclusive about the gendered associations of family reunification on mental health (hypothesis 3). On the one hand, the coefficients are larger for women across all analysis (albeit not significant in Model 6). On the other hand, comparing the kernel density plots, it becomes evident that the distributions of estimated MCS are similar and the higher mean association of women is likely due to a couple of individuals experiencing extreme increases in mental health after reunification.

We perform additional analyses to corroborate the robustness of our findings in terms of self-selection and size of the family living abroad (see Appendix Tables A6–A8). First, the panel fixed-effects regression does not allow for a strict causal interpretation of results. We provide a robustness check that only estimates the relative change in MCS over time. This set up utilizes much fewer cases and is thus prone to more statistical uncertainty than the panel regression.[30] It provides an indication that the findings are not due to a self-selection of refugees with high mental well-being into experiencing family reunification, given the direction of the coefficient being positive. Yet, we are cautious about comparing the coefficients in magnitude, given the lesser power resulting from analyzing reunifications taking place after 2016 only. Second, we show how a larger share of family members living abroad decreases mental health.

5. Discussion

This analysis provides insights into the associations of family reunification on refugee mental health over time. The results indicate that family reunification improves mental health outcomes for refugees. For this analysis, we define family reunification as institutionally supported reunification or the individual effort to reunite. Hence, the results in this analysis are applicable to a wide array of countries:

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[30] For this method, the group of "treated" individuals, those experiencing family reunification, is diminished as only reunification after first interview in 2016 can be counted (see Online Appendix Table A7, section 3.3).

those enabling comprehensive resettlement and reunification programs as well as those in which individual mobility of family members creates opportunities for reunification.

Applying fixed-effect regressions on panel data of the IAB-BAMF-SOEP Survey of Refugees in Germany, we observe how reunifications are associated with refugee mental health. We find that the first reunifications are positively associated with mental health outcomes of refugees. Yet, the association does not increase in size for further reunifications taking place than two. Our findings match previous work that found a negative association of family separation on mental health (Löbel, 2020; Nickerson et al., 2010). The pathway through which the association unfolds can be explained with lowering the burden of knowing that family members aboard might live in danger (Nickerson et al., 2010). An increase in social support and being embedded in a broader local network does not seem to be the dominating mechanism, giving the non-linearity of the association (Goodson & Phillimore, 2008; Honohan, 2009). In the end, having experienced family reunification rather seems to be an event with positive implications for refugee mental health. Its frequency though is less important. Incoming refugees might initially need support and family roles change after reunification (Rask, Warsame, & Borell, 2015). These incidences might explain the decreasing rate at which the number of reunifications is associated with positive mental health for those already in the host community. Other than that, given the relatively young refugee population, most will only reunite with the spouse, hence the opportunity for additional reunifications is small in the first place. Other than that, the size of the correlation is larger when only focusing on reunification with the nuclear family. This finding highlights the importance of the nuclear family for refugee well-being. It can be a hint that the emotional burden of family separation from a partner and children is much higher than a lack of larger family social support. The plan to reunite with children and a spouse seems more imminent than reuniting with siblings, not even speaking about other relatives such as parents our cousins.

The data does not indicate that the effect of family reunification on mental health is larger for women. Instead, the results reveal, that women have less opportunity to reunify with their family as they often immigrate with them in the first place. The potential of increasing social support through family reunification is thus limited for women in general – and for those that can realize reunification we do

not have a robust indication that the effect is larger compared to men. This finding calls for further research as it is in part conflicting with previous research on gendered effects of social support and social integration among refugees. Previous research on integration trajectories found for instance gendered employment and language associations, explained with how women form and utilize social networks more often in the private sphere (Beiser & Hou, 2017; Cheung & Phillimore, 2018; Jacobsen et al., 2020). Adding to the discussion of gendered effects on social support and mental health, we present a substantially new finding as the data indicates that refugee men experience a much higher association between reunification and mental health once siblings are not included in the models. For women, the association remains equally large throughout the different model specifications. In contrast to men, they seem to improve their mental health equally through all kinds of family resources, also that of reunification with siblings.

Data and analytic strategy come with limitations. First, though the fixed-effect models account for unobserved heterogeneity such as ability, the results do not allow for a strict causal interpretation. Notably, several robustness checks indicate little self-selection into experiencing family reunification. Second, the analysis is no evaluation of a policy design. It does not differentiate reunification through legal and non-legal means. Theoretically, there is little foundation to differentiate unless one postulates that legal means are more secure for those following and have a different association with refugee mental health. It would be interesting to investigate the association of changes in family reunification policy on refugee mental health. Knowing that states support family reunification can be a glimpse of hope for many. Third, the mechanisms by which family reunification is associated with refugee mental health remain unidentified. Fourth, although the results are robust over several specifications, the number of family reunifications in the data set is low given the limited opportunities of refugees to reunite in practice, particularly with siblings (Table A3). The non-significant associations for female refugees might be due to the limited numbers of family reunification per individual. This limited number of observations in the data is likely based on the circumstance that female refugees more readily arrive with the entire family, hence with limited opportunity to reunite although they have a family. The opportunity, reflected in our data, is much larger for male refugees. In the same vein, it is important to

mention that our findings only apply to a sub-group of the refugee population, when considering reunification with a nuclear family. After all, most refugees in Germany are young, male and without a nuclear family. Hence, these individuals do not have the possibility to reunite with a spouse or children in the first place. In the end, it is an opportunity not every refugee has, particularly as the right to reunification is limited to the core family. Future research can build upon the resource model and employ panel analyses to investigate the implications of family reunification for other integration outcomes: finding employment, improving education and language skills as well as managing administrative processes and broadening local support networks. Additionally, research should further outline the strength but also the limitations in social support provision within refugee families in the host communities and further explore gender differences. Though we have argued that the institutional context is only one enabler for family reunification, comparative research could disentangle legal settings and their implications for family reunification as well as how changes in family reunification policy affect refugee mental health.

In many contexts, family reunification policies apply restrictively. Germany suspended the reunification program and resumed it in 2018 with quotas. Applications have since reached the quota while demand for reunification is higher (Deutsche Welle, 2019). The reason for limited institutional support is twofold. On the one hand, visa processes in countries of conflict are slow or absent and do not catch up with demand. On the other hand, restricting reunifications is a political signal and answer to a public discourse on the costs and benefits of (refugee) migration (Kofman, 2004; Ruffer, 2011; von Hermanni & Neumann, 2019). The findings from our analyses add to the argument for family reunification, particularly the nuclear family. While we did not differentiate between legal and non-legal means, it is the institutional setting that can be actively changed in order to ensure safe passage and reunification for refugee families at destination: with equally positive mental health implications for refugee men and women.

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7. Appendix

Legal context

Treaties

Family unity as a human right has first been laid down in Article 16 of the Universal Declaration of Human Rights in 1948. Since then, it has been recognized in other legal instruments. Derived from this very clear assertion of the right to family unity, the 1951 Convention Relating to the Status of Refugees equally confirms family unity for refugees. A list of other treaties naming the right to family unity includes the European Convention for the Protection of Human Rights and Fundamental Freedoms 1950 (Art. 8), the European Social Charter 1961 (Art. 16), the International Covenant on Civil and Political Rights 1966 (Art. 17 and 23), and the International Covenant on Economic, Social and Cultural Rights 1966 (Art.10). Other treaties citing family unity are the American Convention on Human Rights 1969 (Article 17), Additional Protocol 1 of 1977 to the Fourth Geneva Convention Relative to the Protection of Civilian Persons in Times of War 1949 (Article 74), the African Charter on Human and Peoples' Rights 1981 (Article 18), the Convention on the Rights of the Child 1989 (Articles 9, 10, and 22), and the African Charter on the Rights and Welfare of the Child 1990 (Articles XXIII and XXV).

Definition of the family

Despite its clarity on family unity, international law is missing a universal definition of the term "family". The increasing body of academic work and many legal rulings however point to the definition of a family as the "nuclear" family, meaning spouses and their (minor) children.

Legal definitions in the German context

Germany is signatory to all conventions listed above, also the 1951 Geneva Convention. Generally, when asylum seekers[31] arrive in Germany, there are four potential outcomes of their asylum application

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[31] All asylum seekers receive a residence permit based on their pending asylum procedure (Art. 55 of the Asylum Procedure Act).

and only the first and second listed residence titles are linked to the right to family unity explicitly by means of the law.[32]:

1) Recognition as a refugee (3-year residence permit)

The first source of legal protection from political persecution is Art.16a of the German Basic Law (*Grundgesetz*). Only a minority of refugees in Germany receives protection by means of this title since most refugees move to Germany via other European countries in which they could have equally claimed asylum. Instead, many refugees hold a title in line with the Geneva Refugee Convention and Art.60 (1) of the Act on Residence, Economic Activity and Integration of Foreigners in the Federal Territory (*AufenthG*). These first two titles are directly linked with the German Basic Law and the Geneva Convention, hence with the state obligation to reunite families.

2) Subsidiary protection (1-year residence permit)

A less protective residence status specifically designed for refugees in Germany is subsidiary protection provided by Art 60 (2-4) of the *AufenthG.* It is granted in cases of torture, civil war and other inhumane practices carried out in the country of origin. This title has been implemented in order to provide a safe harbor for those who, legally speaking, do not fall under the Geneva Convention or the German *Grundgesetz*, but need protection, nevertheless. The title grants a one-year residence permit (compared to a three-year residence permit for refugees).

3) Ban of deportation (no residence permit)

An even less protective residence status compared to the Geneva Convention is the ban of deportation (Art. 60 (5) *AufenthG*). Legally speaking, a ban of deportation does not constitute a residence permit but only avoids deportation due to medical conditions or administrative issues (e.g., invalid passport). The ban is revoked as soon as the reason for the ban disappears.

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[32] For our analysis, we have grouped both together.

4) Deportation

In the event that the asylum claim is rejected, asylum seekers are deported within few weeks.

The family reunification procedures for the first two titles and hence groups of refugees are enshrined in the German *Aufenthaltsgesetz (Residence Act)*. Primarily, the *AufenthG* regulates family reunification in Germany in Art.27 ff. in cases where refugees have a valid passport, sufficient housing space and secure their own livelihoods. The second means to achieve family unity is the so called "privileged family reunification" via Art. 29(2) *AufenthG*. In these cases, an applicant must not prove financial independence. Nonetheless, such request for family unity only applies within three months after having received a residence permit.

Particularly refugees with subsidiary protection fall within a specific regime of family reunification laws in Germany. From 2016 onwards, family reunification for this group was suspended for two years, and has been limited for 1000 individuals per month since 2018 (Deutscher Bundestag, 2018b, 2018a, 2018c).

Descriptive statistics continued

Table A1: Descriptive statistics of dependent and independent variables of interest per gender – Mean, standard error in parentheses

Variable	(1) Men	(2) Women	(3) Difference
MCS	49.347	47.127	-2.220***
	(11.508)	(11.544)	(0.292)
Age			
18-25 years	0.250	0.206	-0.044***
	(0.433)	(0.405)	(0.011)
26-35 years	0.335	0.370	0.034***
	(0.472)	(0.483)	(0.012)
36-45 years	0.260	0.268	0.009
	(0.438)	(0.443)	(0.011)
46+ years	0.155	0.155	0.001
	(0.362)	(0.362)	(0.009)
Country of Origin			
Syria	0.581	0.572	-0.009
	(0.493)	(0.495)	(0.013)
Iraq	0.126	0.128	0.002
	(0.332)	(0.334)	(0.008)
Afghanistan	0.116	0.106	-0.010
	(0.320)	(0.308)	(0.008)
Iran/ Pakistan	0.049	0.032	-0.017***
	(0.216)	(0.177)	(0.005)
Eritrea/Somalia	0.057	0.051	-0.006
	(0.232)	(0.221)	(0.006)
Serbia/Albania/Kosovo	0.011	0.010	-0.001
	(0.103)	(0.098)	(0.003)
Others	0.060	0.101	0.041***
	(0.238)	(0.301)	(0.007)
	2,014.769	2,014.918	0.150***
Year of immigration			
	(1.214)	(0.992)	(0.029)
Education			
Primary education	0.352	0.407	0.055***
	(0.478)	(0.491)	(0.012)
Secondary education	0.395	0.384	-0.011
	(0.489)	(0.487)	(0.012)
Tertiary education	0.197	0.154	-0.043***
	(0.398)	(0.361)	(0.010)
Education – missing values	0.056	0.055	-0.000
	(0.229)	(0.229)	(0.006)
Family status			
Single	0.378	0.228	-0.150***
	(0.485)	(0.420)	(0.012)

Married	0.620	0.769	0.149***
	(0.486)	(0.422)	(0.012)
Family status – missing values	0.002	0.003	0.001
	(0.044)	(0.057)	(0.001)

Children

No kids	0.472	0.280	-0.192***
	(0.499)	(0.449)	(0.012)
Kids	0.528	0.720	0.192***
	(0.499)	(0.449)	(0.012)

Employment

Not employed	0.737	0.940	0.203***
	(0.440)	(0.238)	(0.010)
Employed	0.263	0.060	-0.203***
	(0.440)	(0.238)	(0.010)

Accommodation

Private accommodation	0.717	0.811	0.094***
	(0.451)	(0.392)	(0.011)
Public accommodation	0.283	0.189	-0.094***
	(0.451)	(0.392)	(0.011)

Asylum status

No decision	0.196	0.182	-0.014
	(0.397)	(0.386)	(0.010)
Recognised	0.755	0.770	0.015
	(0.430)	(0.421)	(0.011)
Rejected	0.050	0.048	-0.002
	(0.217)	(0.214)	(0.005)

German knowledge

No knowledge in German	0.296	0.463	0.167***
	(0.457)	(0.499)	(0.012)
Some knowledge in German	0.368	0.306	-0.062***
	(0.482)	(0.461)	(0.012)
Good knowledge in German	0.335	0.231	-0.104***
	(0.472)	(0.422)	(0.012)

Meeting people with same nationality

Never	0.094	0.142	0.048***
	(0.292)	(0.349)	(0.008)
Seldom	0.212	0.282	0.069***
	(0.409)	(0.450)	(0.011)
Regularly	0.231	0.233	0.002
	(0.421)	(0.423)	(0.011)
Often	0.463	0.343	-0.120***
	(0.499)	(0.475)	(0.012)

Meeting German nationals

Never	0.180	0.262	0.082***
	(0.384)	(0.440)	(0.010)
Seldom	0.198	0.258	0.060***
	(0.399)	(0.437)	(0.010)
Regularly	0.154	0.165	0.011
	(0.361)	(0.372)	(0.009)
Often	0.468	0.315	-0.153***
	(0.499)	(0.465)	(0.012)
Integration course			
No	0.295	0.424	0.129***
	(0.456)	(0.494)	(0.012)
Yes	0.705	0.576	-0.129***
	(0.456)	(0.494)	(0.012)
PCS	54.377	50.617	-3.761***
	(9.517)	(10.577)	(0.252)
Number of migrants in neighborhood	192.874	192.011	-0.863
	(158.152)	(156.016)	(3.992)
N	4,114	2,496	6,610

Table A2: Individuals having family reunification before and after first interview in the survey, including siblings

Family reunification before first interview		Family reunification after first interview	
N	% of sample	N	% of sample
630	18.77%	224	6.74

Table A3: Number of family reunifications per gender – in person years

Number of reunifications	Reunifications, including siblings		Reunifications, excluding siblings		Reunifications, excluding siblings (eligible only)	
	Male	Female	Male	Female	Male	Female
0	3,239	1,862	3,432	2,005	2,224	1,721
1	411	491	350	433	350	433
2	335	97	308	48	308	48
3	61	22	9	6	9	6
4	39	11	6	2	6	2
5	11	8	3	0	3	0
6	12	4	4	1	4	1
7	4	1	0	1	0	1
8	1	0	1	0	1	0
9	1	0	1	0	1	0

Table A4: Measurement points of the MCS per survey year and sample

Sample	2016	2017	2018
M3	✓		✓
M4	✓		✓
M5		✓	✓

Gendered regression analysis continued

Figure A1-3 show kernel density plots of the predicted MCS differentiated by gender. The comparison indicates that the distribution of outcomes is fairly equal between men and women. Having in mind the RMSE of the unnested models, equal in size for both gender specificities, we conclude that the differences in association we find for within group differences, are not in fact substantially different between groups.

The models can be compared as the underlying root means squared error (RMSE) remains equal for the female and the male models.

Figure A1: Kernel density distributions of predicted MCS outcomes, including siblings in the reunification process

Graphs by Gender
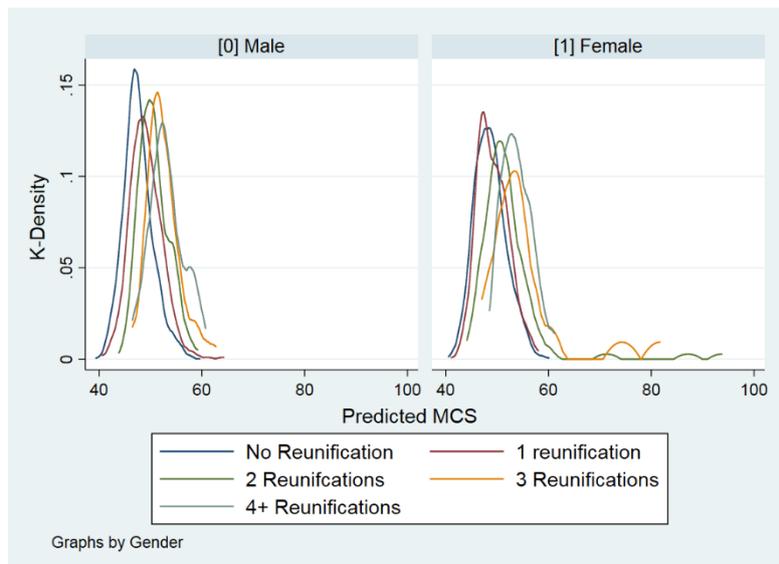
Figure A2: Kernel density distributions of predicted MCS outcomes, excluding siblings in the reunification process

Graphs by Gender
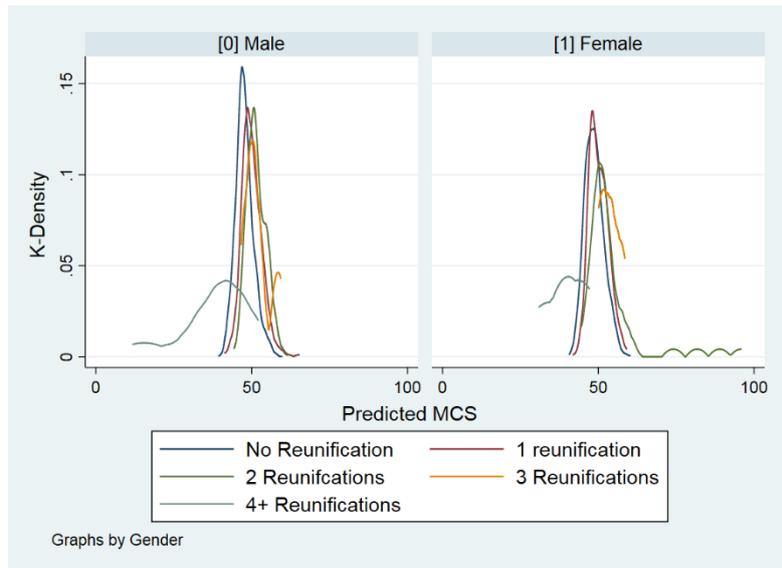
Figure A3: Kernel density distributions of predicted MCS outcomes, excluding siblings in the reunification process, sample restricted to individuals with families to reunite with.
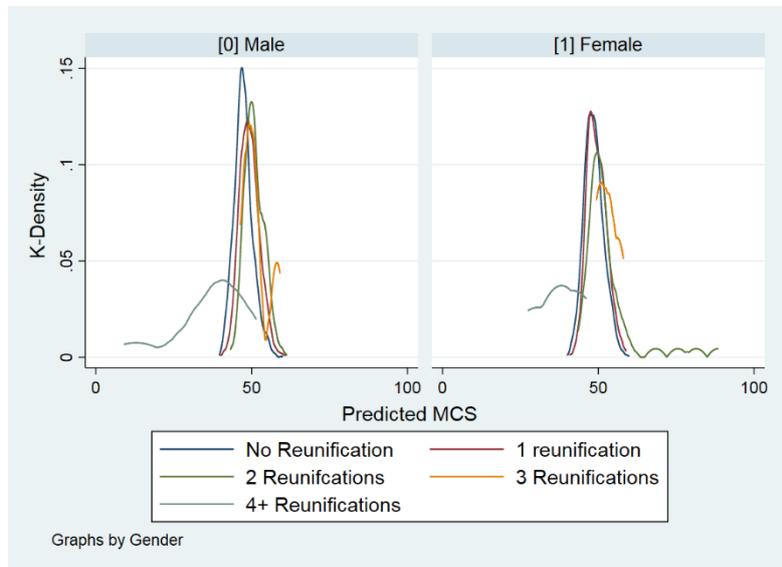
Graphs by Gender

Control variables include: employment status, type of housing, asylum status, knowledge of the German language, meeting people of the same nationality and meeting people of German nationality as well as time from interview to first reunification, time from interview to first reunification squared, PCS, participation in integration courses, number of individuals with a migration background in the area and survey year.

Further, Table A5 provides the gendered analysis from the main manuscript presented as an interaction effect.

Table A5: Unstandardized coefficients and standard errors of the association of family reunification on refugee mental health, interaction effects of gender, interacted control variables not displayed

	Model 1	Model 2	Model 3
Family reunification (incl. siblings)	1.61		
	(1.28)		
Family reunification (incl. siblings) x gender	1.92		
	(2.65)		
Family reunification squared (incl. siblings)	-0.26		
	(0.31)		
Family reunification squared (incl. siblings) x gender	0.69		
	(0.65)		
Family reunification (excl. siblings)		3.77**	3.94**
		(1.48)	(1.56)
Family reunification (excl. siblings) x gender		1.56	1.13
		(3.32)	(3.40)
Family reunification squared (excl. siblings)		-1.07**	-1.15**
		(0.46)	(0.49)
Family reunification squared (excl. siblings) x gender		0.42	0.54
		(0.79)	(0.82)
N	6610.00	6610.00	5118.00
Within subject standard deviation (sigma_e)	9.79	9.79	9.77
rho	0.57	0.57	0.58
R^2 - within	0.06	0.06	0.06

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Control variables include: employment status, type of housing, asylum status, knowledge of the German language, meeting people of the same nationality and meeting people of German nationality as well as time from interview to first reunification, time from interview to first reunification squared, PCS, participation in integration courses, number of individuals with a migration background in the area and survey year – all interacted with gender.

Robustness checks

Additional analysis using share of family members remaining in the country of origin as independent variable

One could argue that the benefit of family reunification lies in unifying the entire nuclear family. Saying this, we also check in how far the share of the overall nuclear family still abroad is associated with refugee mental health. This analysis is only based on refugees who experienced family reunification after the first interview in 2016, as we cannot estimate this share for individuals with prior unifications. An increase of the share individuals remaining abroad is associated with a significant decrease in mental health.

Table A6: Unstandardized coefficients and standard errors of the association of the share of families abroad in Germany on refugee mental health

	Model 1 Full	Model 2 Full	Model 3 Restricted
Share of family remaining in country of origin (incl. siblings)	-0.14**		
	(0.06)		
Share of family remaining in country of origin (excl. siblings)		-0.09***	-0.08***
		(0.02)	(0.02)
N	6610.00	6610.00	5118.00
Within subject standard deviation (sigma_e)	9.81	9.80	9.76
rho	0.51	0.49	0.50
R^2 - within	0.05	0.05	0.06

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Control variables include: employment status, type of housing, asylum status, knowledge of the German language, meeting people of the same nationality and meeting people of German nationality as well as time from interview to first reunification, time from interview to first reunification squared, PCS, participation in integration courses, number of individuals with a migration background in the area and survey year.

Checking for self-selection into family reunification

It seems plausible that refugees with better mental health are more likely to realize family reunification as they hold more agency. In order to rule out that the estimated association of family reunification and mental health of refugees is due to a higher MCS *prior* to family reunification, we only use respondents who have not achieved family reunification until 2016 in a cross-sectional robustness check. The independent variable is coded 1 if the respondent was reunited with his/her family between 2016 and 2018, and 0 otherwise. Meanwhile, the dependent variable is the difference in the MCS between 2016 and 2018. With this approach, the actual size of the MCS is not important, but only the de- or increase between 2016 and 2018. As we work with respondents who have not reunited with their family until 2016 this set up allows for a causal interpretation of results. The effect size indicates that the event of family reunification between 2016 and 2018 (coded y/n) increases mental health. Please note that the effect sizes are statistically not significant. This comes as no surprise since only few respondents reunited between these two years (see also Table A2). After all, most reunifications we observe in the data occurs before 2016, given the legal restrictions for family reunification between 2016 and 2018 in Germany. The direction of the effect sizes, however, support our main analyses and conclusion that family reunification increases mental health.

Table A7: Multivariate Linear Regression Analysis on the relative change in MCS before and after family reunification – Unstandardized coefficients and standard errors in parentheses

	Model 1 Full	Model 2 Full	Model 3 Restricted
Number of reunifications with family, incl. siblings	1.81* (1.10)		
Number of reunifications with family, excl. siblings		2.01 (1.33)	2.26* (1.34)
N	2629.00	2629.00	1981.00
R^2 - within	0.02	0.02	0.02

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Note: We further control for the first time a respondent was interviewed as a dummy variable. The control variables were observed prior to first family reunification. Control variables include: age groups, gender, family status, having children, education level, country of origin, employment status, type of housing, asylum status, knowledge of the German language, meeting people of the same nationality and meeting people of German nationality as well as time from interview to first reunification, time from interview to first reunification squared, PCS, participation in integration courses, number of individuals with a migration background in the area and survey year.

Table A8: Multivariate Linear Regression Analysis on the relative change in MCS before and after family reunification, by gender – Unstandardized coefficients and standard errors in parentheses

	Model 1 - Male	Model 2 - Female	Model 3 - Male	Model 4 - Female	Model 5 - Male	Model 6 - Female
Number of reunifications with family, incl. siblings	1.14	3.80*				
	(2.03)	(2.24)				
Number of reunifications with family, excl. siblings			2.05	3.22	2.39	3.57
			(2.00)	(2.90)	(2.15)	(2.90)
N	1665.00	954.00	1665.00	954.00	1150.00	831.00
R^2 - within	0.03	0.01	0.03	0.01	0.03	0.00

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Note: We further control for the first time a respondent was interviewed as a dummy variable. The control variables were observed prior to first family reunification. Control variables include: age groups, gender, family status, having children, education level, country of origin, employment status, type of housing, asylum status, knowledge of the German language, meeting people of the same nationality and meeting people of German nationality as well as time from interview to first reunification, time from interview to first reunification squared, PCS, participation in integration courses, number of individuals with a migration background in the area and survey year.

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CHAPTER 5

A story of resource loss and gain - how family networks affect refugee mental health

1. Introduction

This dissertation offers a sociological perspective on the topic of social resource loss and gain in the realm of forced migration and mental health. It asks: *How do (kinship) social networks influence refugee mental health in the aftermath of migration?* First, applying a mental health approach, this dissertation advances the argument that mental health should be seen as a resource itself. Not only does this framing avoid stigmatizing those with mental disorders. It enables a discussion that is much more grounded in the middle of society: how do all individuals of a group fare on a continuum from languishing to flourishing mental health? Second, this dissertation advocates for understanding mental health outcomes in relation to the social environment, its restraints, and possibilities. This approach identifies how forced migration leads to a depletion of important social resources, detrimental for mental health. It also suggests a first pathway through which mental health can be improved, a finding that can be incorporated in politic debates as well as in considerations of treatment options for refugees.

In this conclusion, I will first summarize the findings of this dissertation, followed by a discussion of the findings in light of the body of scientific knowledge. I will indicate how the findings have implications for research and will conclude with the limitations and future avenues of research.

2. Findings

This dissertation explores the social networks and mental health of refugees. Initially, it provides an overview of the evolution of the study of refugee mental illness. Chapter 1 shows how this approach can benefit theoretically from sociological considerations of resource loss and gain in terms of social networks and social support, specifically in the context of mental health. Chapter 2 lays the foundations for a study of the associations between social networks and refugee mental health, comparing susceptibility to social isolation in relation to loneliness, between refugees, other migrants, and the host population in Germany. Chapter 3 and 4 provide insight into the structure of refugee family networks after resettlement, studying resource loss and gain in terms of family separation and reunification.

Therefore, this dissertation explores the structural settings of refugee networks, theorized to be particularly important for their well-being.

Chapter 2 begins with a detailed inventory of the varying degrees of social isolation (objective separation from a social network) and loneliness (as a facete of mental health) among refugees compared to the host society. Refugees show persistently higher levels in both dimensions, a first sign of their vulnerability. The study continues to investigate the degree to which social isolation and loneliness are associated in the refugee population as well as in the host- and other migrant populations in Germany. It provides arguments against the hypothesis that the association between network structure and mental health should be similar across migrant groups and host population, as suggested by theory grounded in evolutionary developments (Cacioppo & Patrick, 2008). Using a Bayesian evaluation framework enables an assessment of competing hypotheses, for instance testing a specific need for social inclusion among refugees and hence greater susceptibility (Porter & Haslam, 2005; Schweitzer, Greenslade, & Kagee, 2007; Schweitzer, Melville, Steel, & Lacherez, 2006) or a numbing response to trauma, reducing susceptibility (Spahic-Mihajlovic, Crayton, & Neafsey, 2005; Tibubos et al., 2018). Testing the alternative hypotheses lead to the conclusion, that differential susceptibility among the groups exists. However, the findings are contradictory: On the one hand, an analysis of the posterior means and credible intervals suggests that the association between social isolation and loneliness is smaller for migrants and equally high for refugees and the host population. On the other hand, analysing Bayes factor and posterior model probabilities yields an interpretation in which refugees evince a higher association between social isolation and loneliness. The chapter concludes that given initial level differences in social isolation and loneliness, refugees can be seen as overall more vulnerable than other migrants and the host population.

Chapter 3 investigates the network structure of refugees, starting at the family level. It looks (1) into the family network size of refugees, (2) the existence of different role relations, (3) and how families are geographically distributed inside and outside of Germany. These three social network measures are indicative of closeness, and hence access to potential emotional support (Burt, 2000, 2001; Wellman & Frank, 2000). While elsewhere transnational networks are portrayed as supportive in this specific

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vulnerable situation (Boyd, 1989; Herz, 2015; Viry, 2012), I test the argument that family separation creates stress in the refugee population (Nickerson, Bryant, Steel, Silove, & Brooks, 2010), with detrimental effects for mental health. The results of a cross sectional regression analysis show that the size of the nuclear family matters for mental health, while the size of the extended family network does not. This might be counterintuitive given qualitative studies. Evidence in other contexts shows that those with similar traumatic experience can more easily relate and provide specific support (Thoits, 2011). Additionally, among refugee narrative accounts, the extended family has been referred to as a fall back option for support provision (McMichael & Manderson, 2004; Simich, Beiser, Stewart, & Mwakarimba, 2005; Whittaker, Hardy, Lewis, & Buchan, 2005). This initial finding is further backed by the role relation analysis, highlighting the positive implications of having a partner and children only. Otherwise, only having a father signals a positive association to refugee mental health, most likely given the cultural context of refugees and the predominantly male population. Last, separation from the nuclear family has a large negative association on mental health. Family separation is hence an identified stressor, in line with other factors of the post-migration phase, such as living in shared accommodation and still being in the application process for asylum (Carswell, Blackburn, & Barker, 2011; Khawaja, White, Schweitzer, & Greenslade, 2008; Nickerson et al., 2010; Porter & Haslam, 2005; Walther, Fuchs, Schupp, & von Scheve, 2020).

Chapter 4 studies the broadening of refugee social networks in the form of family reunification in Germany and increased spatial proximity using fixed effect regression techniques. Observing moves of family members to Germany either by formal or informal avenues over time, this dissertation shows the positive association between reunifications and refugee mental health. This association has only been established in qualitative accounts to this point (Choummanivong, Poole, & Cooper, 2014; McNatt et al., 2018; Miller, Hess, Bybee, & Goodkind, 2018; Stevens, 2016; Wilmsen, 2013). In summary, it seems to be sufficient to know family members have moved into the same country. In the analysis, it was not possible to test for the move into the same city but this circumstance does not devalue the reunification. Yet, positive association between family reunification and refugee mental health gets smaller with each additional move and moreover does not differ by gender, as initially hypothesized.

Overall, the findings are an indication in favour of social network-based interventions on refugee mental health – again with a focus on the nuclear family.

Graph 1: Evidence of social determinants on mental health in the context of forced migration. The dimensions discussed and analysed in this dissertation are highlighted in blue, next to the circled concepts, which have been previously studied qualitatively.
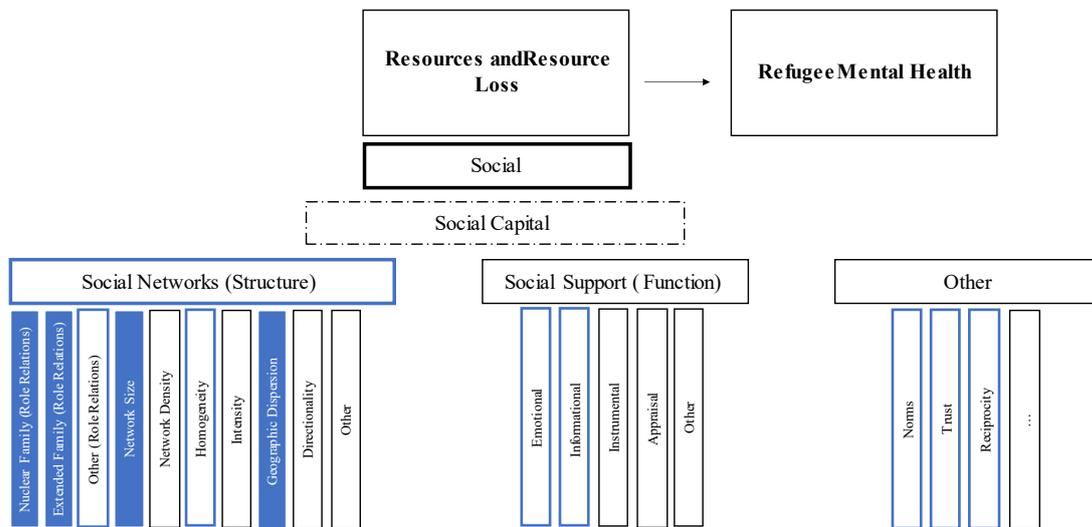
Note: Network size refers to the number of individuals with whom a person has a relationship, density is a description of the network pointing out the extent of connection among groups of network members. Homogeneity refers to an indicator of demographic similarity among individuals in a network and intensity to frequency of contacts. The directionality of linkages can be an indicator of power relations and network-based resources, that are often also referred to as social capital, can be the education or employment status of those an individual is linked to.

The overall contribution of this dissertation to the body of literature on refugee mental health lies in its combination of observations from sociology as well as psychiatry, and psychology. Taking a multidisciplinary approach allows the acknowledgement of a long tradition of understanding trauma and mental disorder of refugees outside of sociology. However, it highlights that traumatic events do not happen in a social vacuum, but are either shared or endured alone, adding to stress but also contributing to recovery. This dissertation takes the resource model of refugee mental health as proposed by Ryan, Dooley, and Benson (2008) as a starting point. It firstly shifts from a focus on mental illness to mental health. It further combines the model with considerations of social network resource loss and gain in terms of size, spatial distribution, and alterations from sociology and health research: a stylized social resource model of refugee mental health is established and tested. Not only does this

dissertation reveal the susceptibility to resource loss with regards to mental health among refugees. In approaching the different network-specific dimensions discussed in sociology among forced migrants (Graph 1), this dissertation starts bridging the divide between the health sciences and sociology, moving towards a better understanding of refugee mental health from a social structural perspective which includes resource loss and gain.

3. Implications

The empirical chapters have implications on how we can reflect on the needs of refugees and how to utilize their social environment to provide the best possible support in the aftermath of resettlement:

From an outcome perspective, the results *inform treatment options* and therefore also disciplines outside of sociology: psychology, psychiatry, and social work. Considering the stressors experienced regularly in the context of asylum and displacement, a broader spectrum of interventions is required that can cater to the various states of mental health in refugee populations. Particularly useful seems the engagement of peers and the treatment of the entire nuclear family for the process – an example of a form of network intervention, including those that have had similar experiences (Thoits, 2011). This stance is supported by the findings from Chapter 2: The lack of social resources affects refugees more strongly with regards to their mental health than is the case among other migrants, given their level differences in social structure and mental health as well as the association between both variables. This result underlines the importance for more varied support interventions, beyond supporting outcomes that are desirable for host communities such as finding employment and learning a new language. The nuclear family is quantitatively shown to have an overall positive association with refugee mental health. It can be utilized as an everyday support system, up to a point where refugees can recognize, and report individual excessive mental health languishing (Chapter 3 and 4). In the end, it is still to be further investigated on how certain social resources might be substitutable and still effective in mental health provision. Mentoring programs for refugees and other peer-based interventions outside the nuclear family are only in their beginning of investigation.

Taking the social structure into account, this research also has a *political signal*, derived from the second and third empirical chapter (Chapter 3 and 4). Family reunification policies are used as political tools. Given little to no chance to receive support in family reunification, these policies deter refugees from separating prior to migration and become a reason for return migration. Yet, as has been declared elsewhere with access to health care by refugees (Bozorgmehr & Razum, 2015), restrictions are not a simple zero-sum game in favour of the host community. The cost of not catering to the needs of refugee families might be much higher than the cost of supporting family reunification. Meanwhile, return migration is still very low in Germany, even 5 years after the large increase in migration itself (UNHCR, 2021) , and after delays and limits on family reunification support. In the end though, there are genuine hurdles to the attainment of family reunification and to live a decent life lie elsewhere: First, some family members lose contact with one another and cannot afford regular communication. Second, visa applications in the countries of origin are sometimes impossible to apply for, due to waiting times. Third, reunification is not for everyone: Many do not intent to reunite with families in the first place and others do not have a (nuclear) family to reunite with. Hence, extensive increases in migration resulting from family reunification from refugees might be less likely than publicly discussed.

Comparing the results from this dissertation to *sociological theory* on how social networks function for the achievement of other outcomes, two conclusions can be made: First, there is a limit to how network structure positively provides for mental health. While network structure, its size and in other instances also density is often used as a proxy for an increase in support (Wellman & Frank, 2000), the analyses in Chapter 3 and 4 highlight at least the limited supportive function of an increase in the kinship network beyond 2 or 3 close confidants. This finding highlights the need to understand the link between role relations and social support better. A limited number of close supporters might be more effective for mental health promotion than the overall size of the family social network of an individual. After all, this finding holds in a context in which the overall need for support is high. The substitutability of family role relations seems limited, specifically given certain preferences (Hobfoll, 2001; Niboer & Lindenberg, 2002; Ormel, Lindenberg, Steverink, & Verbrugge, 1999; Ryan, Dooley, & Benson, 2008). Second, not all of those ties we consider strong are indeed strong: The extended family does not seem

to play an important role for mental health, compared to qualitative research on refugees in the past (Perry & Pescosolido, 2012; Wellman & Wortley, 1990).

4. Limitations and future research

The major limitation of this dissertation has been voiced in the empirical chapters as well: The concepts of social capital, network structure, and social support are not applied jointly in this study. In fact, they mostly are not, and the underlying mechanisms are inherently difficult to disentangle. Measuring social isolation in a composite fashion in the first empirical chapter, this dissertation makes a modest attempt at reconciliation. Yet, as is visible in Chapters 3 and 4, it is strikingly difficult to combine several network components in one, given data limitations. Either data is related to a network's structure, or the focus is on its function. This problem also applies in the SOEP. The data is a long way from offering a network approach outside of the household. Meanwhile, network function is only surveyed every second year, and merely measures the subjective experience of social support. Network-based human capital, for instance through the education or employment profile of network members, is not measured outside of the household. Underlying mechanisms like coping are totally disregarded. However, I hope that by laying out the differences in network structure, function, and capital in chapter 1, I can meaningfully delineate the different concepts and ground the research underlying this dissertation in the realm of the study of refugee network structure. Here, several interesting avenues are yet to be studied:

As Lin, Burt and many others have pointed out, the focus on the family means the study of a close-knit network of an individual only. It is thus warranted to further explore the social network structures of refugees beyond the kinship bonding network: First, it is important to get a better understanding of the degree of binding and linking networks in the refugee community (Burt, 2001; Granovetter, 1973; Lin, 2001; Wellman & Frank, 2000), with other refugees, but also with the host population (Legewie et al., 2019) and public institutions such as health care providers (Bozorgmehr & Razum, 2016; Jefee-Bahloul et al., 2016). This very structural approach can indicate the degree of social isolation and integration of

refugees in the host society. Second, from network structure, functional aspects should be further investigated. Which kind of support is provided by which kind of network? Conceiving of structure and function jointly is a very basic but necessary exercise, one that has not – to my knowledge – been carried out in the context of migrants or refugees. Agneessens and colleagues have made first efforts to understand this linkage (Agneessens, Waege, & Lievens, 2006) and the study could be replicated and applied to the situation of migrants and refugees. Besides, the question arises whether the association of certain network structures and role relations on refugee mental health changes with time as the role of refugees in the host population changes and with this the need for certain types of support (Beiser & Hou, 2017). As a final step, the notion of social capital can be reincorporated: as a link from social structure and function to the actual resources transmitted. Of particular interest is refugees' access to other forms of capital, and how these forms of capital, for instance education and employment, serve as both enabling and limiting factors

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SUMMARY

Refugees are a particularly vulnerable group of migrants, given experiences throughout forced migration. Research has emphasized their elevated risks to suffer from post-traumatic stress disorder and other mental illnesses. Yet, knowledge on their resource gain and protective factors is largely missing. This dissertation develops a social resource model of refugee mental health, combining theoretical considerations from health with sociology (Chapter 1). It argues for the study of broader mental health as an outcome, to overcome a disease mongering trap focusing on mental illnesses. Moreover, this dissertation makes an empirical contribution to understanding social resource loss and gain as well as links to refugee mental health, using data from the German Socio-Economic Panel Study (SOEP).

Chapter 2 asks the initial question whether refugees are more susceptible to social isolation with regards to loneliness. Drawing on theories of resource needs, numbing and self-selection, the analysis tests competing hypotheses on the strength of association between social isolation and loneliness among refugees, host populations and other migrants in Germany. Susceptibility to social isolation with regards to loneliness is equally strong for refugees and host populations. However, given higher level differences in both variables of interest, refugees can be regarded as overall more vulnerable.

Chapter 3 investigates refugee family structures after resettlement and how this potential social resource relates to refugee mental health. Applying social network theory and approaches on family role relations, the analyses point towards a significant positive association between the size of the nuclear family and mental health. Moreover, the chapter shows how separation from the nuclear family is associated with lower levels in refugee mental health.

Chapter 4 observes family reunification taking place in Germany and how this resource gain specific to the migration context is associated with refugee mental health. Results show how family reunification with the nuclear family has a significant positive association with refugee mental health. However, the return on mental health outcomes decreases for additional members joining. Moreover, the analysis does not show clear gender differences between these associations.

ZUSAMMENFASSUNG

Geflüchtete sind aufgrund ihrer Fluchterfahrung eine besonders vulnerable Gruppe von MigrantInnen. Die Forschung hebt immer wieder ihr erhöhtes Risiko hervor, an posttraumatischer Belastungsstörung und anderen psychischen Erkrankungen zu leiden. Dennoch fehlt es an Wissen über den Ressourcengewinn und andere schützende Faktoren, die die mentale Gesundheit von Geflüchteten positiv beeinflussen. In dieser Dissertation wird ein soziales Ressourcenmodell der psychischen Gesundheit von Geflüchteten entwickelt, das theoretische Überlegungen aus der Soziologie und Gesundheitsforschung kombiniert (Kapitel 1). Es fokussiert sich auf die psychische Gesundheit im weiteren Sinne, um die Erfahrungen und Auswirkungen der Flucht nicht pauschal zu pathologisieren. Darüber hinaus leistet diese Dissertation einen empirischen Beitrag zum Verständnis sozialer Ressourcenverluste und -gewinne sowie deren Zusammenhänge mit der psychischen Gesundheit von Geflüchteten unter Verwendung von Daten des Sozio-oekonomischen Panels (SOEP).

In Kapitel 2 stellt sich die Ausgangsfrage, ob Geflüchtete anfälliger für soziale Isolation in Bezug auf Einsamkeit sind. Unter Rückgriff auf Theorien zum Bedarf sozialer Ressourcen, emotionaler Taubheit und der Selbstselektion werden konkurrierende Hypothesen zur Stärke des Zusammenhangs zwischen sozialer Isolation und Einsamkeit bei Geflüchteten, der Aufnahmebevölkerung sowie anderen MigrantInnen getestet. Die Anfälligkeit unter sozialer Isolation an Einsamkeit zu leiden ist bei Geflüchteten und der Aufnahmebevölkerung gleich stark ausgeprägt. Berücksichtigt man beides, höhere Niveauunterschiede bei sozialer Isolation und Einsamkeit, sowie die starke Assoziation beider Variablen, können Geflüchtete jedoch insgesamt als vulnerabler angesehen werden.

Kapitel 3 untersucht die Familienstrukturen von Geflüchteten nach der Flucht und wie diese Ressource mit der psychischen Gesundheit von Geflüchteten zusammenhängt. Unter Anwendung sozialer Netzwerktheorie und der Theorie zu familiären Rollenbeziehungen weisen die Analysen auf einen signifikant positiven Zusammenhang zwischen der Größe der Kernfamilie und der psychischen Gesundheit hin. Darüber hinaus zeigt sich, wie die Trennung von der Kernfamilie mit einem niedrigeren Niveau der psychischen Gesundheit von Geflüchteten korreliert.

Kapitel 4 betrachtet Familienzusammenführungen von Geflüchteten in Deutschland und wie dieser migrationskontextspezifische Ressourcengewinn mit deren psychischer Gesundheit zusammenhängt. Die Ergebnisse zeigen, dass die Familienzusammenführung mit der Kernfamilie einen signifikant positiven Zusammenhang mit der psychischen Gesundheit von Geflüchteten hat. Allerdings nimmt der Nutzen für die psychische Gesundheit ab, wenn weitere Mitglieder hinzuziehen. Darüber hinaus zeigt die Analyse keine klaren Geschlechterunterschiede der Assoziationen.