Turning the tide: countering syndemic vulnerability in a Dutch fishermen community

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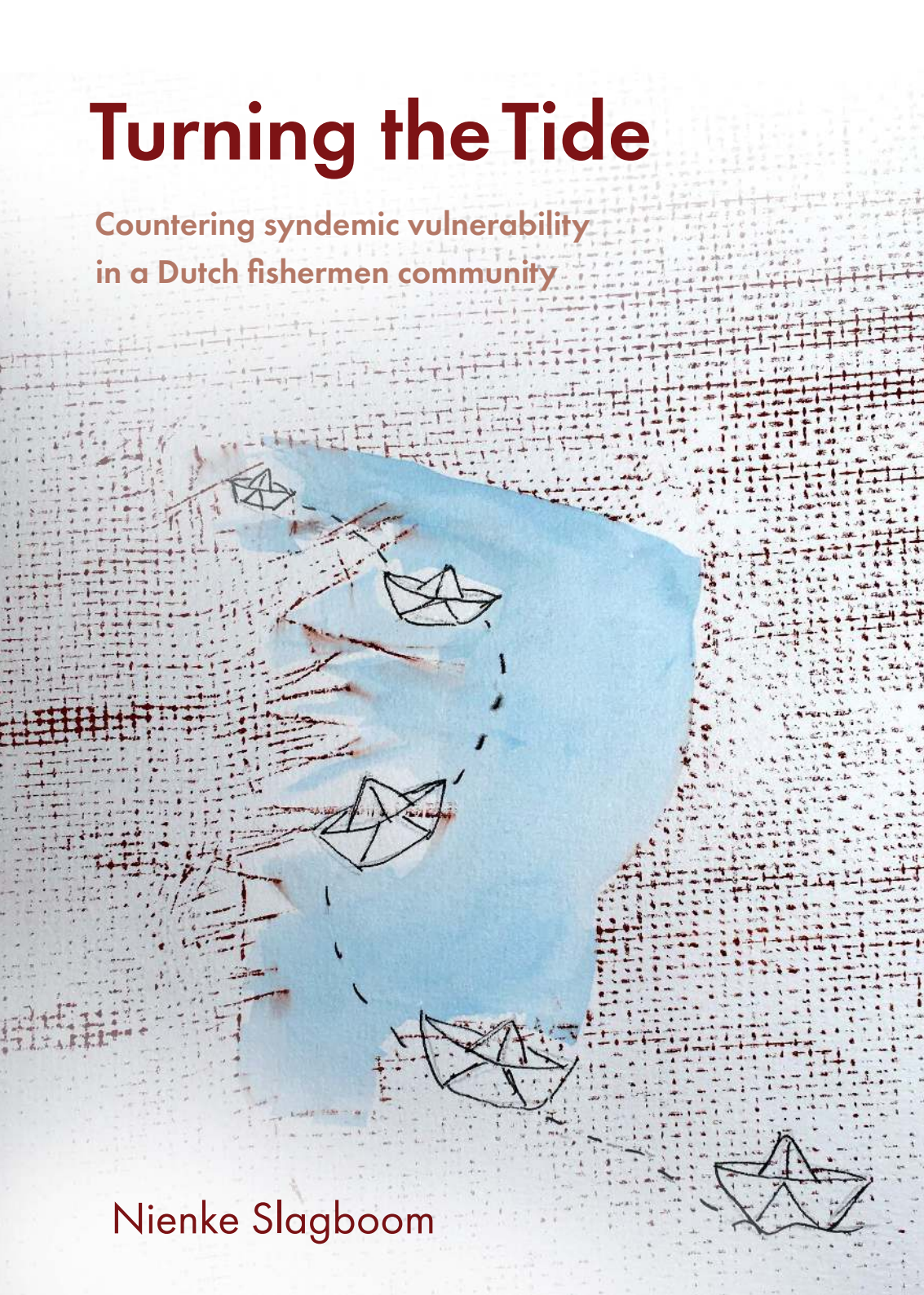

Nienke Slagboom

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Countering syndemic vulnerability

in a Dutch fishermen community

Margaretha Nienke Slagboom

Turning the tide: Countering syndemic vulnerability in a Dutch fishermen community

Margaretha Nienke Slagboom, 2023

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Turning the tide

Countering syndemic vulnerability in a Dutch fishermen community

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Dr. B. Kohrt, George Washington University
Prof. Dr. S.P.J. Kremers, Universiteit van Maastricht

Voor alle kinderen – klein en groot - met wie ik stukjes mocht oplopen.

Voor de toekomstige generatie, voor mijn nichtjes en neefjes:
Geeke, Jiska, Josien, Mozes, Christoph, Tobias en voor Aster Sig.

The only true voyage of discovery […] would be not to visit strange lands but to possess other eyes, to behold the universe through the eyes of another.

Marcel Proust, 1923, La Prisonnière

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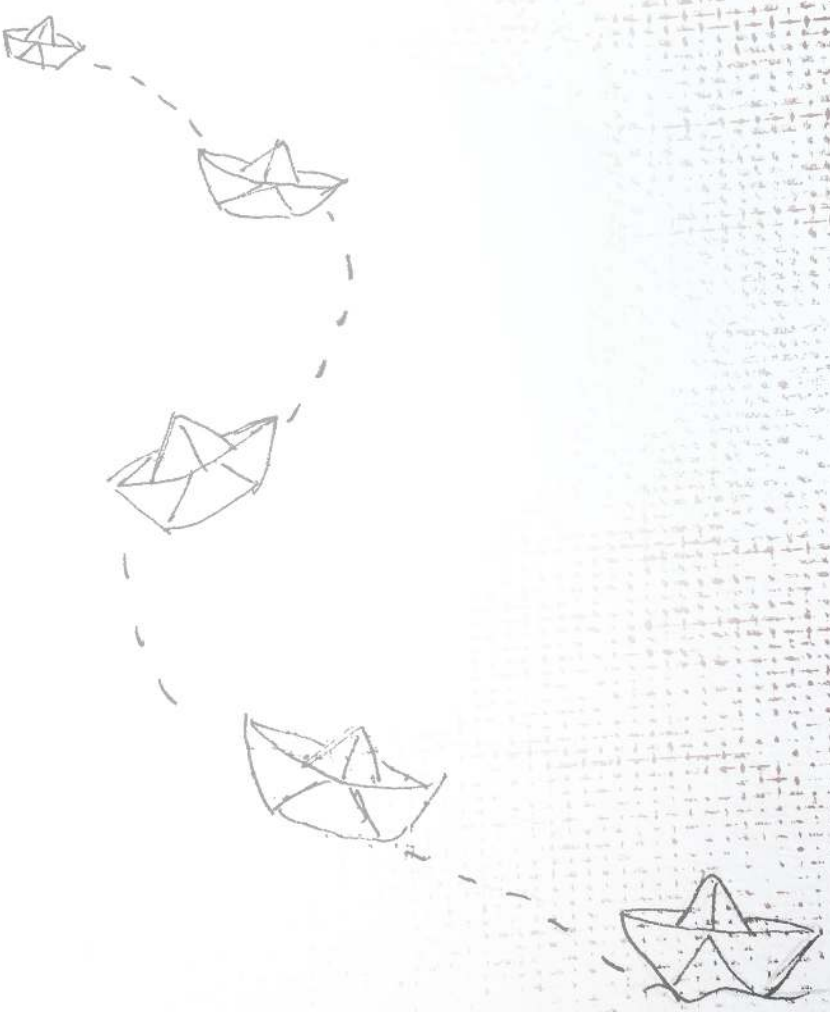


Chapter 1

General Introduction

PERSISTENT HEALTH DISPARITIES

Families in low income areas are often disproportionally affected by poor health (Gilson et al., 2007; Mackenbach et al., 2008). In the Netherlands, an affluent country that is a strong welfare state, lower-educated groups have a significantly lower life expectancy at birth (up to 6.5 years less) and disability-adjusted life years (up to 15.5 years less) compared with higher-educated groups (Broeders et al., 2018). Such health disparities have been shown to be persistent in other European welfare states (Mackenbach, 2012; Mackenbach et al., 2008).

Health disparities are linked to the circumstances under which people grow, live, work and deal with ill health (Commission on Social Determinants of Health, 2008). Populations with a lower socioeconomic position in the Netherlands persistently report more morbidity than those with higher positions (Hoeymans et al., 2010). In these populations, continuous stress often underlies a cascade of life-shortening chronic health conditions (Berger et al., 2019; Everson et al., 2002; Kivimäki et al., 2015). Notable socioeconomically patterned health conditions include non-communicable diseases such as diabetes, depression, cardiovascular disease, and musculoskeletal pain. These non-communicable diseases account for the highest number of deaths and disabilities in populations generally, and in socioeconomically disadvantaged populations in particular (World Health Organisation, 2019).

Despite decades of scientific research into the processes and mechanisms that contribute to health disparities (Bouchard et al., 2015; Cash-Gibson et al., 2018) and various policy efforts to close the health-disparity gap within one generation (Cheng et al., 2016; Commission on Social Determinants of Health, 2008), progress has been limited (Gilson et al., 2007; Mackenbach, 2012). Children continue to grow up in adverse social circumstances, which puts them at a greater risk of suffering from poor health later in life.

There is a need to build forward for improved approaches to persistent health disparities (Gilson et al., 2007; Wilderink et al., 2022). Unfortunately, health care systems intended to break the cycle of intergenerational poor health often do not reach their potential (Gilson et al., 2007). First, the majority of actions to address health disparities are directed towards a single health condition, for example, diabetes or depression, but these health conditions often co-occur in socioeconomically disadvantaged populations. It remains largely unknown how health conditions cluster and influence each other in adverse socioeconomic contexts (Singer et al., 2017). Second, while the link between the lives of parents and children is well known (Cheng et al., 2016; Jones et al., 2019), the majority of public health interventions focus on only one generation, for example, lifestyle interventions for children or adults (Cheng et al., 2016; Cheng & Solomon, 2014; Jones et al., 2019). Third, efforts to address health disparities predominantly focus on solutions targeting downstream factors (Box 1.1), overlooking mid- and upstream factors that are also known to significantly affect the health of populations and local communities (Acheson, 2001; Braveman & Gottlieb, 2014). In short, how to build a way forward that can effectively address persistent health disparities in a holistic/contextual way is an important question that has yet to be answered.

Upstream factors refer to the circumstances in which people are born, grow, live, learn and age; the broader political, economic and social conditions that shape vulnerability for poor health.

Midstream factors, such as health behavioural norms and health care organisations, are intermediate factors that affect neighbourhoods and local communities.

Downstream factors refer to factors at the individual or family level, such as behavioural risk factors or parental health.

Box 1.1 Upstream, midstream and downstream factors affecting population health

A NOVEL PUBLIC HEALTH APPROACH

Syndemics theory is a novel, actionable framework to understand and address health conditions that arise and persist under conditions of social inequality (Singer et al., 2017; Singer et al., 2006). The field of syndemics looks at the clustering and interaction of multiple diseases, with particular attention to mid- and upstream factors that contribute to disease clustering within a given population and context (Singer, 2000). This theory posits that these intertwined health problems produce a stronger and more intense overall adverse health outcome than when each of the conditions or maladies are experienced separately (Singer, 2000). At its core, syndemics theory is concerned with "how upstream factors and experiential dimensions affect 'how people get sick, where they get sick, and why they get sick'" (Minicucci et al., 2021:2).

Anthropologist Merrill Singer introduced the syndemics theory in the 1990s, at the height of the HIV/AIDS epidemic (Singer, 1996). In Hartford, Connecticut, he observed that the Puerto Rican community was disproportionally affected by that epidemic. Building on mixed method research (ethnography, interviews and epidemiological data) among this inner-city population, Singer found that people who tended to suffer from AIDS also suffered from substance abuse and violence. He was the first to describe how substance abuse, violence and AIDS (SAVA) clustered within a specific population, showing how these health and social conditions are closely linked and work as interdependent threats to health. In other words, with syndemic theory, Singer elaborated an epidemiological framework that allows for the description of complex health problems resulting from the interaction between epidemic diseases and endemic adverse social conditions (Singer, 2000; Weaver et al., 2016). This framework was introduced in the midst of long-standing and well-documented debates on the single disease framework, comorbidity (Mendenhall, 2016a; van den Akker et al., 1996; Weaver et al., 2016) and multimorbidity (Lefèvre et al., 2014; Marmot et al., 2012; Navickas et al., 2016; Singer & Clair, 2003; van den Akker et al., 1996).

Until recently, the majority of studies in the field of syndemics have focused on HIV/AIDS (Singer et al., 2020). However, in the past few years, an increasing number of syndemics studies have also looked at population-level clustering of non-communicable diseases (Lerman, 2015; Mendenhall, 2012, 2016a; Mendenhall et al., 2017; Singer et al., 2020). Many syndemics studies have been focused on marginalised groups, such as minority racial/ethnic groups (Hossain et al., 2021; Singer et al., 2020) and men who have sex with men (Herrick, 2011; Mustanski et al., 2014; Stall et al., 2008).

Emily Mendenhall (Mendenhall, 2016b) was the first to identify and describe the clustering of depression and diabetes among Mexican immigrant women in the United States who also experienced harmful social conditions of violence and abuse. She coined the term VIDDA to describe the clustering of health and social problems among Mexican immigrants: violence, immigration-related stress, depression, diabetes and abuse. The clustering of diabetes and depression has subsequently been found in numerous contexts worldwide, often among populations that experience social and economic hardship (Lerman, 2015; Mendenhall et al., 2017; Trainer et al., 2017; Weaver & Mendenhall, 2014).

EPIDEMIOLOGICAL PUZZLE OF KATWIJK

To date, syndemics studies in high-income countries such as the Netherlands remain scarce. The studies in this dissertation were therefore conducted in Katwijk, a former fishing village on the west coast of the Netherlands. In the past, Katwijk had one of the largest fishing fleets in the Netherlands (Deursen, 2011). For centuries, the village was known for its occupation, orthodox Protestant religious traditions, close-knit families, and a distinct social structure in which men often worked off-shore for weeks or months while women stayed on shore and took care of the family (Deursen, 2011).

The community has experienced rapid contextual changes over the past five decades due to welfare reforms, climate change and globalisation (Deursen,

2011). Since the 1960s, as a result of fishing bans, quotas and outsourcing, the fishing industry rapidly deteriorated in Katwijk. Subsequently, following mass unemployment, men shifted to other blue-collar occupations on shore, which brought about great changes in families' everyday lives.

The existing cross-sectional data for the village presented an epidemiological puzzle of intertwined adverse physical and mental health outcomes. Among women in Katwijk, yearly mortality rates are higher compared to the rest of the region and compared to the Dutch population as a whole (34). Moreover, a preliminary analysis indicated that 34% of adults presented with two or more health conditions (multimorbidity) (Municipal Health Organization for Preventive Healthcare, 2009; Slagboom et al., 2016). Cardiovascular diseases, diabetes and musculoskeletal pain often co-occurred within individuals and in the population. Forty percent of the total adult population in Katwijk reported one or more health conditions in this cluster (Municipal Health Organization for Preventive Healthcare, 2009; Slagboom et al., 2016). While such multimorbidity could be expected among the elderly population, it was striking that among those ages 19–34, 20% already suffered from one or more of these conditions.

These observations of multimorbidity across multiple generations prompted questions about the intergenerational nature of disease clustering in populations like Katwijk. Since non-communicable diseases such as cardiovascular disease and diabetes are rare among young people, the data regarding the youth (age < 18) of Katwijk could not answer questions about the clustering of these health conditions in the youngest generation. However, preliminary analyses showed that a higher proportion of youth in Katwijk were overweight, and had higher rates of smoking, alcohol and drug use than those in neighbouring communities (GGD Hollands Midden, n.d.). The data also showed a clustering of health behaviours (smoking, binge drinking, limited physical activity and poor dietary intake) among adolescents in Katwijk. This health behaviour cluster went hand in hand with poorer self-rated health and more social problems: higher rates of skipping classes and school ab-

sence. While these data indicate that health and social problems co-occur in Katwijk, the life histories behind these data remain unknown.

SYNDEMIC RESEARCH IN KATWIJK

Former fishing communities such as Katwijk are likely to be vulnerable to syndemic interactions due to their history of harsh working conditions and occupational hazards (Dolan et al., 2005; Matheson et al., 2001), as well as the adverse socioeconomic conditions in which the people in such communities typically live, including income uncertainty and poor access to health care (Turner et al., 2018; Woodhead et al., 2018). Given the high prevalence of multimorbidity and the village's history of adverse social conditions and rapid contextual change, the epidemiological profile of the former fishing village of Katwijk raises questions about syndemic processes and the possibility of breaking the cycle of poor health.

This dissertation explores the health profile of Katwijk through a syndemic lens. The research questions on syndemics indicators, contextual drivers for syndemics, the intergenerational nature of syndemics and possibilities for interventions are described below and illustrated in Figure 1.

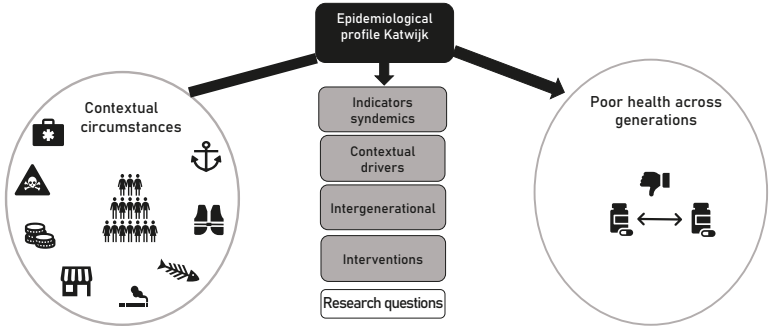


Figure 1. Research questions using a syndemics lens

CLUSTERING, INTERACTION AND CONTEXT

The case of poor health in Katwijk touches upon a key methodological question in syndemics scholarship: does the clustering of non-communicable diseases in this population indicate the presence of a syndemic? As syndemics theory is increasingly applied in medicine, public health and anthropology, for example in studies of Covid-19, the call to rethink methodological questions has become stronger (Mendenhall & Singer, 2019; Singer et al., 2022; Singer et al., 2020; Singer et al., 2021; Tsai, 2018). The debates centre around the three criteria to establish a syndemic (Singer, 1996; Singer et al., 2017), as described below in Box 1.2.

(1) *Disease clustering*: Two (or more) diseases or health conditions cluster within a specific population.
(2) *Disease-disease interaction*: clustering of diseases results in adverse disease interaction, either biological or social or behavioural, increasing the health burden of affected populations.
(3) *Disease-context interaction*: Contextual and social factors create the conditions in which two (or more) diseases or health conditions cluster.

Box 1.2. Three criteria for a syndemic

A number of review studies have addressed the ongoing methodological and conceptual struggles over the best way to define and identify a syndemic (Pirrone et al., 2021; Singer et al., 2020; Tsai & Burns, 2015; Tsai & Venkataramani, 2016). In Singer's review of studies between 2015–2019, only 30% of nearly 200 publications used the syndemics concept as originally defined (Singer et al., 2020). Another study, by Tsai and Burns, observed that while many studies provided rich observational data on disease clustering, very few studies used the appropriate methods to test synergistic disease interaction, thereby lacking empirical evidence of this distinguishing feature of syndemics (Tsai & Burns, 2015).

One instance of a gap in syndemics research is the fact that the synergistic interaction of non-communicable diseases, such as diabetes and depression in the VIDDA syndemic, remains largely unconfirmed (Singer et al., 2021). Focusing on the disease-context criterium, Pirrone and colleagues' review (Pirrone et al., 2021) revealed that syndemic researchers tend to emphasise local contextual factors that promote disease interaction rather than broader contextual factors (i.e., upstream factors). For example, syndemics studies were more likely to explore local living and working conditions than the political or policy environment that shapes local living and working conditions.

Relatedly, Mendenhall and Singer have warned against a tendency to gloss over local histories of inequity and oppression. For example, in response to a surge of studies that approached Covid-19 as a (global) syndemic (Courtin & Vineis, 2021; Horton, 2020; Huizar et al., 2021; Mendenhall et al., 2022; Mendenhall & Singer, 2019; Minicucci et al., 2021; Neira et al., 2021; Shrinivasan et al., 2020), the authors argued that 'syndemic arrangements are always unique to communities' and should be studied as regional rather than global public health events (Singer et al., 2022; Singer et al., 2021). This position rests on the argument that the contexts that promote ill health can vary from one place to another. To account for the abovementioned methodological issues that are faced when researching syndemics, mixed-methods scholarship—which triangulates population data, life-course histories and ethnography—is recommended (Mendenhall et al., 2022; Tsai, 2018; Tsai & Venkataramani, 2016).

In Katwijk, the available existing data could not provide the information needed to assess the three criteria for syndemics (Box 1.2). Knowledge about the prevalence of specific disease clusters in the population was lacking, there was no empirical proof of synergistic interaction between frequently occurring non-communicable diseases and knowledge on the living circumstances and history of people who suffered from one or more diseases was limited.

Consequently, the first two research questions of this dissertation are:

1. *Which indicators are present for syndemics in the population of Katwijk?*
2. *Which contextual conditions drive vulnerability to disease clustering and adverse disease interaction in the population of Katwijk?*

POOR HEALTH OUTCOMES ACROSS GENERATIONS

The Katwijk case also prompts questions about the intergenerational nature of syndemics, which remains poorly understood. The existing epidemiological data for Katwijk consist of cross-sectional data covering different age groups but did not provide information on families. Therefore, it remains unknown whether vulnerabilities for multimorbidity are present across generations within a single family. However, as mentioned before, a preliminary analysis indicated a clustering of health behaviour and social problems among adolescents.

Evidence from other settings suggests that behavioural pathways may lead to the development of cascading health conditions later in life (Lerman, 2015; Mendenhall, 2016b). Moreover, growing up amid parental stress related to income, work, social exclusion, and poor health—which is likely for youth in former fishing communities like Katwijk—is known to increase the risk for poor health later in life (Berger et al., 2019; Kivimäki et al., 2015). To address the intergenerational nature of syndemics, the third research question of this dissertation is:

3. *Which contextual conditions drive vulnerability to disease clustering and adverse disease interaction across generations in the population of Katwijk?*

To examine the contextual conditions that drive disease clustering and adverse disease interactions over the life course and across generations,

this dissertation combined syndemics and life-course theory. The life-course framework, developed on the basis of Elder's (Elder Jr, 1974) study of families of the Great Depression, has been widely adopted to study health trajectories among historically socioeconomically disadvantaged families and populations (Jones et al., 2019).Therefore, the four core notions of life-course theory—historical time and place, timing in lives, linked lives and human agency—were used to guide the data collection for multiple generations in Katwijk and the analysis of the ethnographic data (Elder Jr, 1994; Elder Jr & Shanahan, 2006).

Overall, to assess the indicators of syndemics and processes that might drive diseases to cluster in Katwijk, we built on an explanatory sequential design which consisted of a quantitative and qualitative arm (Creswell & Clark, 2017). In the quantitative arm of the study, we examined disease clustering, adverse disease interaction and explanatory factors for the presence of disease clusters. In the qualitative arm of the study, which triangulates oral histories, interviews and participant observation among families, we turned our lens to shared experiences/exposures that might predispose the population of Katwijk to persistent poor health.

TRANSLATION INTO CARE

The Katwijk case prompted numerous questions about early intervention, in particular, what the possibilities for early intervention might be, if the population-level clustering and the contextual factors that contribute to it were identified and better understood. While experts have advocated for syndemic interventions (Singer et al., 2021; Singer et al., 2017) —multicomponent interventions combining non-medical social interventions as well as clinical interventions— to date, there is little published evidence that such an approach has been implemented (Singer et al., 2020; Singer et al., 2021). This leads to the fourth and final question guiding this dissertation:

4. *How can findings from syndemic studies be translated into early public health interventions?*

To examine how findings from syndemics studies can be translated into early interventions, we will build on the qualitative research method known as participatory action research approach (Minkler & Wallerstein, 2011), a widely used method to collaboratively learn about, and collaboratively address, health disparities (Giachello et al., 2003; Olshansky et al., 2005; Wallerstein & Duran, 2006). Following our examination of indicators for syndemics, as described above, researchers, families and professionals from the social, medical and policy domain in Katwijk collaborated to restructure existing early interventions. In a joint effort, existing care activities were adapted to pay attention to the social circumstances of the family as a whole.

OBJECTIVE AND OUTLINE OF THE DISSERTATION

As shown above, this dissertation addresses a wide range of research questions that will be answered throughout the following four chapters. As a whole, this dissertation explores the contribution of the syndemics framework for understanding and addressing persistent health disparities. The methodology employed for each of the four studies will be described in detail in each chapter.

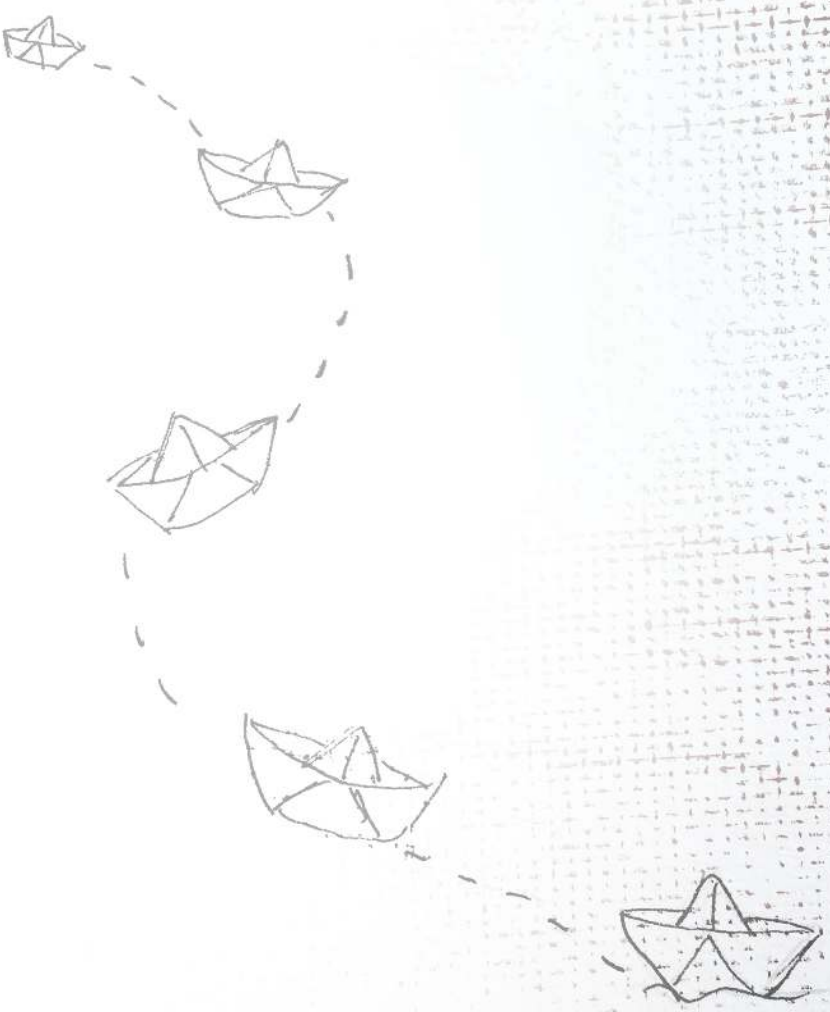
Chapter 2 assesses the three syndemics criteria in the epidemiological data of Katwijk. This cross-sectional study examines the prevalence and co-occurrence of non-communicable disease in Katwijk, estimates whether disease interaction contributes to self-rated health, and identifies which contextual variables are associated with interacting clusters of non-communicable diseases.

Chapter 3 investigates the intergenerational nature of syndemics by examining themes and patterns related to syndemic vulnerability across families and generations in Katwijk. This chapter traces processes leading to or from syndemic vulnerability by studying and comparing the life histories of seven families.

Chapter 4 provides an example of translating findings regarding syndemic vulnerability into an early intervention. For this pilot study, we integrated an intergenerational approach into the Gezamenlijk Inschatten Zorgbehoefte (GIZ), a frequently used and shared assessment tool for children's care needs in child preventive health care in the Netherlands. With the help of local professionals, the GIZ methodology was adapted to address parents' strengths and needs concerning changing their own behaviour and/or helping their children with behavioural change. The aim of this study was twofold: first, to monitor the effects of this family-engagement tool on the health behaviour and wellbeing of both children and their parents and second, to explore and understand the different dynamics of health behavioural change within a family.

Chapter 5 provides a contextual analysis of the low uptake of weight-related health promotion for children for a fuller understanding of processes leading up to persistent health disparities in the setting of Katwijk. Building on the notion of subversion, the study examines whom and what is protested against when weight-related health promotion is contested.

Chapter 6 discusses the findings of these studies separately and in relation to each other, addresses new and open research questions, presents methodological reflections and highlights what the syndemic lens adds to understanding, and ultimately addressing, persistent health disparities. Based on the discussions described above, this final chapter also provides a roadmap for future research and interventions.



Chapter 2

Psychological distress, cardiometabolic diseases and musculoskeletal pain: A cross-sectional, population-based study of syndemic ill health in a Dutch fishing village

M. Nienke Slagboom, Ria Reis, Alexander C. Tsai, Frederike L. Büchner, Annemarie D.J van Dijk, Mathilde R. Crone

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ABSTRACT

Background Disease clustering is a growing public health concern and is increasingly linked to adverse socioeconomic conditions. Few population-based studies have focussed on interaction between non-communicable diseases. In this cross-sectional study, we examine clustering of, and synergistic interactions between, frequently occurring non-communicable diseases in Katwijk, a former fishing village in the Netherlands. Additionally, our study identifies contextual variables associated with these clusters of non-communicable diseases.

Methods In a survey among adults (>19 years) living in the former fishing village Katwijk, Netherlands, were asked about non-communicable diseases, psychological distress, self-rated health scores and contextual factors, eg, socio-demographic, psychosocial and health behavior characteristics. Interaction was measured on the additive and the multiplicative scale. We used generalized ordered logistic regression analysis to examine associations with contextual variables.

Results Three disease clusters were found to be most prevalent among the study participants (n=1408). Each cluster involved a combination of frequently occurring conditions in this population: psychological distress (n=261, 19%), cardiometabolic diseases (n=449, 32%) and musculoskeletal pain (n=462, 33%). These three diseases interact synergistically on the additive scale to increase the odds of reporting a low self-rated health. None of the disease clusters showed a statistically significant positive interaction on a multiplicative scale. Multiple contextual factors were associated with these disease clusters, including gender, loneliness, experiencing financial stress, and a BMI ≥30.

Conclusion Our findings imply that psychological distress, cardiometabolic diseases and musculoskeletal pain synergistically interact, leading to a much lower self-rated health than expected. Several contextual factors are related to this interaction emphasizing the importance of a multicomponent, ecological approach.

INTRODUCTION

Disease clustering is increasingly recognized as a major public health concern (World Health Organization, 2016). In the European Union alone, it is estimated that 50 million people suffer simultaneously from multiple conditions and with a rapidly aging population this number is expected to increase (Navickas et al., 2016).

The field of syndemics looks at the clustering and interaction of multiple diseases, with particular attention to macro and microsocial factors that contribute to disease clustering within a population and a given context (Singer, 1996). The theory posits that these intertwined health problems produce a stronger and more intense overall adverse health outcome than if each of the conditions or maladies were experienced separately. With syndemic theory Singer elaborated an epidemiological framework that would allow room to describe complex health problems resulting from the interaction between epidemic diseases and harmful endemic social conditions (Singer, 1996; Weaver et al., 2016). This framework was introduced in the midst of long standing and well documented debates on the single disease framework, comorbidity and multimorbidity and its determinants (Lefèvre et al., 2014; Navickas et al., 2016; van den Akker et al., 1996; Weaver et al., 2016).

Non-communicable diseases account for the greatest burden of disease and highest number of deaths, and disability in high income settings and are rapidly rising in low- income settings (World Health Organization, 2019). Several studies have examined the clustering of non-communicable diseases (Mendenhall et al., 2017; Weaver & Mendenhall, 2014), but fewer have studied the interactions between these diseases (Tsai & Burns, 2015; Tsai & Venkataramani, 2016). As disease interaction has been theorized as one of the defining characteristics of syndemics (Singer, 1996), this paper examines if the presence of two or more diseases leads to a higher burden of disease than expected based on the independent contributions of the diseases considered in isolation (Tsai, 2018; Tsai et al., 2017).

This study examines these research questions in the population of Katwijk, the Netherlands. The objectives of the study were to estimate the prevalence and co-occurrence of non-communicable diseases in Katwijk, to estimate whether disease interaction contributes to self-rated health, and to identify which contextual variables were associated with the interacting clusters of non-communicable diseases.

METHODS

Study population

This study was set in Katwijk, the Netherlands. This Dutch former fishing village was previously known for its close-knit families, limited in-migration, social stratification, religious traditions and migratory work among men (Deursen, 2011). The community has experienced rapid contextual changes over the past five decades due to welfare reforms, climate change and globalization (Slagboom et al., 2020). Currently, the population of Katwijk is characterized by a high prevalence of cardiometabolic diseases (GGD Hollands Midden, 2020).

Study sample and design

This study is based on secondary analysis of anonymized and pooled data from the Health Monitor Survey (2009 and 2012) (Municipal Health Organization for Preventive Healthcare, 2009; National Institute for Public Health and the Environment, 2012) for the working age (19-64 years) and elderly age population (>65 years) in the Netherlands. This cross-sectional, population-based health survey is developed and routinely carried out every four years in all Dutch municipalities to monitor wellbeing and health across the general population of adults, under auspices of the Municipal Health Organization for Preventive Healthcare (GGD) (Municipal Health Organization for Preventive Healthcare, 2009), in collaboration with the National Institute for Public Health and the Environment (RIVM) (National Institute

for Public Health and the Environment, 2012) and Statistics Netherlands (CBS) (Statistics Netherlands).

To be able to compare health outcomes, the Municipal Health Organization for Preventive Healthcare (GGD) (Municipal Health Organization for Preventive Healthcare, 2009) draws random samples of 3-4% of each Dutch municipality every four years (van den Brink et al., 2005). The sample size for the Health Monitor Survey is calculated using the following formula(Korzilius, 2000:

$$384 \div (1 + (383 \div population\ size\ target\ group) \times 1 \div expected\ response\ rate)$$

Based on these calculations, a sample size between 700 and 750 was needed in both survey years. A total of 1624 (2009) and 1849 (2012) people were invited to participate via a postal mailing to their home address (Figure S1 in the Online Supplementary Document). Individuals living in institutions (asylums, prisons or care facilities for elderly, mental health or learning disability) were excluded from participation. The data were collected through paper and pencil and online questionnaires. The working age group initially received a login code for the online questionnaire (2009 and 2012). A reminder letter and paper version were sent after two weeks (2009, 2012) and a reminder letter after four weeks of non-response (2009, 2012). The elderly population was invited to fill out a paper (2009, 2012) or online questionnaire (2009, 2012). Confidentially was explained by outlining procedures that warranted anonymous processing of data, such as assigning each respondent a unique code. Because this study is based on secondary analysis of anonymized data, ethical approval was not needed.

For our study on disease clustering and interaction, we excluded individuals that did not complete all questions on non-communicable diseases (Figure S1 in the Online Supplementary Document).

Measurements

The Health Monitor Survey in 2009 and 2012 elicited information about illnesses, health and health behaviors. While the age specific questionnaires contained different questions in each wave (2009 and 2012), all questionnaires registered Self-rated health (SRH) and indicators for the presence of 17 non-communicable diseases.

Self-rated health (SRH) was used as the outcome measure and as an indicator for burden of disease. SRH has been widely acknowledged to provide an integrative summary of one's health status and to predict morbidity and mortality (DeSalvo et al., 2006; Idler & Benyamini, 1997).

For all non-communicable conditions, except psychological distress, prevalence of a condition was defined by the participant's self-report of a diagnosed or undiagnosed condition within the past 12 months. Disease clustering was defined as the co-occurrence of two or more non-communicable diseases. To ensure replicability and comparability (Violan et al., 2014) (Fortin et al., 2012), we included HMS disease data that was available for the working age as well as the elderly age and we did not restrict on eligibility of conditions.

The following measures of self-rated health, non-communicable diseases and context were included in the analysis (Table 1):

Self-rated health

SRH was measured by a single question from the validated Short-Form 36 (Aaronson et al., 1998): '"In general, how would you say your health is?"(scale 1-5). 2009: '1=Excellent'; '2=Very good'; '3=Good', '4=Fair' or '5=Poor'; 2012: '1=Very good'; '2=Good'; '3=Fair', '4=Poor' and '5=Very poor'. Responses were dichotomized into "High SRH" (excellent/ very good/ good') and "Low SRH" (Fair/ Poor/ Very poor) (Aaronson et al., 1998; Vos et al., 2013).

Psychological distress

Within the HMS, the presence of psychological distress (in the previous month) was assessed through the self-administered 10-item Kessler Psychological Distress Scale (K10) (Kessler & Mroczek, 1994; Kessler et al., 2003), a validated instrument (Donker et al., 2010) to screen for depression and anxiety in the general population. The items of the survey asses symptoms

Table 1. Characteristics of the sample, stratified according to low vs high self- rated health

	n	(%n)	Low SRH (%n)	High SRH (%n)
Total (n=1408)	1408	100.0	17.5	82.5
Age				
Working age (19-64 years)	901	64.0	9.7	90.3
Elderly age (>65 years)	507	36.0	31.4	68.6
Gender				
Female	761	54.5	17.9	82.1
Male	635	45.5	16.5	83.5
Education				
Low	761	54.7	23.8	76.2
Middle	400	28.8	9.0	91.0
High	229	16.5	10.9	89.1
Civil status				
Married or partnered	1090	77.5	15.9	84.1
Widowed or divorced	156	11.1	32.7	67.3
Single	160	11.4	13.1	86.9
Conditions				
Musculoskeletal pain[a]	462	32.9	32.3	67.7
Cardiometabolic diseases[b]	449	31.9	33.0	67.0
Psychological distress	261	18.5	44.1	55.9
Migraine or severe headache	163	11.6	24.5	75.5
Asthma and COPD	127	9.0	40.2	59.8
Chronic inflammatory skin diseases[c]	96	6.8	24.0	76.0
Cancer	48	3.4	56.3	43.8
Chronic enteritis	45	3.2	60.0	40.0

SRH – Self-Rated Health

[a]Conditions belonging to musculoskeletal pain: severe or chronic back disorders, severe or chronic neck and shoulder pain, severe or chronic pain in wrist/hand/elbow, rheumatoid arthritis, arthritis of hip or knee

[b] Conditions belonging to cardiometabolic diseases: coronary heart disease, heart failure, venous disease, stroke, diabetes

[c]Conditions belonging to chronic inflammatory skin diseases: chronic eczema, psoriasis

that represent the entire range of psychological distress: 'In the past 30 days, how often have you' (1=none of the time to 5=all of the time). Responses were summed, and scores ranged from 10 (no distress) to 50 (severe distress). Following previous (Dutch) population studies (Andrews & Slade, 2001; Donker et al., 2010; Uitewaal, 2012), a cut off score of >19 was used to categorize the respondents as having "Medium to high risk for mental health problems".

Non-communicable diseases

Seventeen non-communicable diseases were assessed with questions developed under auspices of Statistic Netherlands (*Standaardvraagstelling Volwassenen en Ouderen*), which have been used in health surveys in the Netherlands over the past two decades (Cavelaars, 1998; Vos et al., 2013; Westert et al., 2005). Respondents were asked to indicate, for each of the conditions separately, whether they suffered from the condition within the last 12 months (Table 1) (Cavelaars, 1998). A detailed description of the way the Health Monitor Survey assessed the seventeen diseases per survey wave is provided in Appendix S2 in the Online Supplementary Document.

Following previous population studies (McDaid et al., 2013), we grouped diseases together into three system groups: "cardiometabolic disease" (heart failure/ coronary heart disease/ high blood pressure/venous disease/stroke and diabetes); "musculoskeletal pain" (severe and chronic back/ neck and shoulder pain/ chronic pain in wrist/hand/ arthritis of hip or knee and rheumatoid arthritis); "chronic inflammatory skin disease" (eczema/ psoriasis).

Context

Across survey waves, the HMS registered the following eleven variables on context:

1) *Age*: "20-34";"35-49"; "50-64"; "65-79"; ">80"
2) *Gender*: 'Male'; 'Female'
3) *Education* was measured by eliciting the highest level of completed education and then grouped into three categories: "High" (university

and higher professional education)'; "Middle" (pre-university and senior general secondary education); "Low" (no education, primary school, lower secondary school, pre-vocational secondary school).

4) *Civil status* was grouped into three categories "Married or partnered"; "Widowed or divorced"; "Single".
5) *Employment status* for working age individuals (19-64 years) was assessed by asking "Which situation is most applicable to your situation?" 'Employed'; 'Paid work for >32 hours'; 'Paid work for <20-<32 hours'; 'Paid work for >12 - < 20 hours', 'Paid work for <12 hours'; 'Retired'; 'Unemployed'; 'Not able to work and on benefits'; 'On benefits'; 'Full time homemaker'; 'Student'. Elderly age individuals (≥65 years) answered the question "Is the AOW (Dutch state pension) your only source of income?" 'Yes'; 'No'. Employment status was then grouped into four categories "Homemaker"; "Retired"; "Benefits"; "Paid work".
6) *Financial stress* was measured by asking questions about debt ('No debt'; 'Risky debt', 'Problematic debt, in need of help') and experiencing difficulties in getting by financially ('Yes'; 'No'). Individuals reporting debt or troubles getting by financially were assigned a value of 1 for presence of financial stress.
7) *Loneliness* was assessed using the self-administered 11-item De Jong Gierveld Loneliness Scale (De Jong Gierveld & Van Tilburg, 1999) (Gierveld & Van Tilburg, 2010). Participants were asked to indicate the extent to which five positively and six negatively and formulated statements applied to their current situation, using three response categories 'No'; 'More or less' 'Yes'. The calculation of item scores is described in detail elsewhere (De Jong Gierveld & Van Tilburg, 1999; Uysal-Bozkir et al., 2017). Total scores could range from 0 (not lonely) to 11 (extreme lonely). A cut off score of >3 is considered to be an indication of "Medium to severe loneliness" (De Jong Gierveld & Van Tilburg, 1999).
8) *Alcohol intake* was measured based on reported number of glasses of alcoholic beverage consumed weekly. Following Dutch Health Council Guidelines 2015 (Gezondheidsraad, 2015), the GGD (Municipal Health

Organization for Preventive Healthcare, 2009) used ≥7 (female) or ≥14 (male) drinks per week as an indicator for heavy drinking.

9) *Smoking* was assessed by the question "Do you (ever) smoke?" 'Yes'; 'I used to smoke'; 'No'.

10) *Body mass index* (BMI) was calculated based on self-reported weight and height (kg/m^2) (Keys et al., 1972) and then categorized into three standardized categories of weight "Healthy weight" (BMI= <25); "Overweight" (BMI= 25-29.9";"Obesity" (BMI:≥30) (Keys et al., 1972; World Health Organization).

11) *Physical activity:* Participants were asked to indicate on how many days they had been physically active for at least 30 minutes, in the past week. Following the Dutch norm for physical activity for adults (Hildebrandt et al., 1999) , responses (0-7 days) were grouped into '>5 days per week' and '≤5 days per week'.

Statistical analyses

The prevalence for each disease and accompanying self-rated health (0= high SRH and 1=low SRH) was calculated. This was repeated for each possible disease cluster. We fitted logistic regression models to assess for synergistic interaction between disease clusters affecting 4% of the population (cardiometabolic diseases [CMD], psychological distress [PD], and musculoskeletal pain [MUS]), adjusting for gender and age. Synergistic interaction was measured on both the additive and multiplicative scales. Building on previous syndemic research (Herrick, 2011) and recent methodological recommendations (Tsai & Burns, 2015; Tsai & Venkataramani, 2016), additive interaction was calculated using relative excess risk due to interaction (RERI) (Rothman, 1986). RERI measures whether the extent to which the effect of two exposures combined exceeds the effect of each exposure considered individually. RERI can range from - infinity to + infinity (Knol et al., 2011), with a RERI of 0 indicating no departure from additivity and a RERI of one or higher indicating a positive departure from additivity. Multiplicative interaction (M) indicates "the extent to which, on the risk ratio scale, the effect of both

exposures together exceeds the product of the effects of the two exposures considered separately" (VanderWeele & Knol, 2014:36).

Lastly, for the disease clusters with statistically significant additive or multiplicative synergistic interaction, we performed logistic regression analysis to examine associations with contextual variable using an ordered outcome (no disease, one disease, two diseases) (Williams, 2006). Due to violations of the assumption of proportional odds, we used partial proportional odds regression to estimate associations between this ordered outcome variable and the contextual variables described previously (Williams, 2006). The partial proportional odds regression model is similar to the ordered logistic regression model except that it permits selected regression coefficients associated with covariates to differ across the logit equations. We constrained the regression coefficients to be equal across the logit equations except for explanatory variables where the proportional odds assumption was violated. For these covariates, we report two odds ratios: one odds ratio that estimates the association between the explanatory variable and the probability of having one or two diseases (compared with no disease), and one odds ratio that estimates the association between the explanatory variable and the probability of having two diseases (compared with one disease or no diseases). Statistical analyses were performed using SPSS version 25 (IBM Corp., Armonk, NY). R Studio 1.3.959 (RStudio PBC, Boston, MA, USA) was used for the interaction assessment (Mathur & VanderWeele, 2018). Stata (StataCorp., College Station, TX, USA) was used for the partial proportional odds regression analysis (Williams, 2006).

RESULTS

The initial Health Monitor Survey pooled sample consisted of 1699 participants: 817 respondents from 2009 and 882 from 2012 (Figure S1 in the Online Supplementary Document). The analysis for this syndemics study was conducted based on a sample of 1408 participants (Table 1).

Clustering

Thirty four percent of the population reported two or more non-communicable diseases. Table 2 shows that the three most prevalent clusters were musculoskeletal pain and cardiometabolic diseases (15%), musculoskeletal pain and psychological distress (9%) and cardiometabolic diseases and psychological distress (7%).

Disease-disease interaction

Table 2 presents the adjusted odds ratios (AORs) for lower self-rated health corresponding to the pairwise association between the three most frequently occurring disease clusters. The RERI exceeded 1 for each of these three disease clusters, indicating positive departures from additivity, i.e., that the diseases have an interactive association with low self-rated health that is greater than what would be expected on the additive scale. None of these disease clusters showed statistically significant positive interaction on the multiplicative scale.

Disease-context association

In the analysis of correlates of disease clustering (Table S3 in the Online Supplementary Document), most of the explanatory variables did not violate the proportional odds assumption, meaning that the association between the explanatory variable and moving from a lower disease cluster category (from no diseases to 1 disease) to a higher disease cluster category (from no diseases or 1 disease, to 2 diseases) was similar irrespective of the level of the dependent variable. Across the three disease clusters, having a greater number of diseases was associated with being of middle age and older, gender (female), financial stress, and body weight (BMI >30).

For a few explanatory variables, violations of the proportional odds assumption were noted. For example, in the analysis of the cardiometabolic disease-psychological distress disease cluster, the effect of loneliness differed across the logit equations, where the effect was much larger for moving from no or 1 disease vs 2 diseases compared with the effect of moving from no disease vs 1 or 2 diseases.

Table 2. Logistic regression model estimates of the additive and multiplicative interactions between disease pairs in their associations with self-rated health, adjusted for age and gender

Condition 1	Condition 2	%n	Low SRH %n	AOR (95%CI)	RERI (95%CI)	Multiplicative interaction
Cardiometabolic diseases	Psychological distress					
0	0	56.7	6.8	1		
1	0	24.8	22.1	3.90 (2.60, 5.65)		
0	1	11.4	27.3	4.70 (3.05, 7.51)		
1	1	7.1	71.0	32.52 (19.44, 54.38)	25.04 (9.18, 40.89)	1.73 (0.88, 3.40)
Musculoskeletal pain	Psychological distress					
0	0	57.5	7.3	1		
1	0	24.0	21.3	3.51 (2.42, 5.10)		
0	1	9.7	27.7	4.92 (3.09, 7.84)		
1	1	8.8	62.1	20.68 (13.06, 32.76)	10.40 (2.81, 17.99)	1.20 (0.61, 2.35)
Cardiometabolic diseases	Musculoskeletal pain					
0	0	50.4	6.6	1		
1	0	16.8	21.2	3.84 (2.47, 5.93)		
0	1	17.7	20.5	3.56 (2.31, 5.49)		
1	1	15.1	46.0	12.04 (8.04, 18.04)	5.64 (1.73, 9.55)	0.88 (0.48, 1.60)

AOR – Adjusted Odds Ratio, CI– Confidence Interval, SRH – Self- Rated Health, RERI – relative excess risk due to interaction

Table 3. Contextual factors associated with the different disease clusters using partial proportional odds regression

Disease clusters	Cardiometabolic diseases, psychological distress		Musculoskeletal pain, psychological distress		Cardiometabolic diseases, musculoskeletal pain	
	AOR (95% CI)					
	1 or 2 diseases vs none	2 diseases vs no diseases or 1 disease*	1 or 2 diseases vs none	2 diseases vs no diseases or 1 disease*	1 or 2 diseases vs none	2 diseases vs no diseases or 1 disease*
Variable						
Age (years)						
19-34	1 (ref)		1 (ref)		1 (ref)	
35-49	0.90 (0.57,1.41)		0.99 (0.65, 1.52)		1.65 (1.03, 2.65)	
50-64	2.17 (1.37, 3.44)		1.69 (1.08, 2.65)		5.35 (3.29, 8.70)	10.70 (5.29, 21.62)
65-79	3.52 (1.81, 6.84)		2.55 (1.32, 4.93)	0.97 (0.44,2.14)	8.13 (4.15, 15.92)	17.05 (7.53, 39.06)
> 80	6.59 (2.73, 15.91)		2.75 (1.19, 6.36)		25.64 (10.16, 64.66)	
Gender						
Male	1 (ref)		1 (ref)		1 (ref)	
Female	1.67 (1.28, 2.19)		1.85 (1.43, 2.41)		1.46 (1.12, 1.91)	
Education						
High	1 (ref)		1 (ref)		1 (ref)	
Middle	0.98 (0.67, 1.44)		1.14 (0.78, 1.65)		1.17 (0.81, 1.70)	
Low	1.20 (0.84, 1.72)		1.11 (0.78, 1.58)		1.14 (0.81, 1.62)	
Civil status						
Married or partnered	1 (ref)		1.11 (0.75, 1.65)		1.01 (0.69, 1.48)	

Table 3. Contextual factors associated with the different disease clusters using partial proportional odds regression (*continued*)

Disease clusters	Cardiometabolic diseases, psychological distress		Musculoskeletal pain, psychological distress		Cardiometabolic diseases, musculoskeletal pain	
	AOR (95% CI)					
	1 or 2 diseases vs none	2 diseases vs no diseases or 1 disease*	1 or 2 diseases vs none	2 diseases vs no diseases or 1 disease*	1 or 2 diseases vs none	2 diseases vs no diseases or 1 disease*
Widowed or divorced	1.19 (0.80, 1.77)		0.95 (0.62, 1.44)		0.96 (0.61, 1.50)	
Single	1.37 (0.89, 2.10)					
Employment						
Paid work	1 (ref)		1 (ref)		1 (ref)	
Retirement	1.51 (0.89, 2.57)		1.20 (0.71, 2.02)	4.50 (2.13, 9.49)	1.39 (0.84, 2.30)	
Benefits	1.94 (1.03, 3.65)		1.49 (0.77, 2.87)	5.40 (2.31, 12.63)	1.36 (0.70, 2.62)	
Homemaker	1.13 (0.72, 1.79)		1.11(0.70, 1.75)	3.38 (1.66, 6.85)	1.31 (0.85, 2.02)	
Financial stress						
No	1 (ref)		1 (ref)		1 (ref)	
Yes	1.91 (1.38, 2.66)		1.90 (1.38, 2.62)		1.12 (0.78, 1.61)	1.85 (1.17, 2.91)
Loneliness						
Low score	1 (ref)		1 (ref)		1 (ref)	
High score	1.82 (1.39, 2.37)	3.50 (2.16, 5.66)	2.22 (1.73, 2.84)		1.13 (0.88, 1.45)	
Smoking						
No	1 (ref)		1 (ref)		1 (ref)	
Former smoker	1.06 (0.79, 1.40)		1.07 (0.82, 1.42)		1.17 (0.87, 1.58)	0.75 (0.52, 1.08)
Yes	1.14 (0.81, 1.61)		1.19 (0.85, 1.65)		1.08 (0.77, 1.52)	0.86 (0.58, 1.28)

Table 3. Contextual factors associated with the different disease clusters using partial proportional odds regression (*continued*)

Disease clusters	Cardiometabolic diseases, psychological distress		Musculoskeletal pain, psychological distress		Cardiometabolic diseases, musculoskeletal pain	
	AOR (95% CI)					
	1 or 2 diseases vs none	2 diseases vs no diseases or 1 disease*	1 or 2 diseases vs none	2 diseases vs no diseases or 1 disease*	1 or 2 diseases vs none	2 diseases vs no diseases or 1 disease*
Alcohol intake						
<7(f)/14(m) units/wk	1 (ref)		1 (ref)		1 (ref)	
≥7(f)/14(m) units/wk	1.20 (0.89, 1.61)		0.79 (0.59, 1.04)		1.30 (0.95, 1.77)	
Body mass index (kg/m^2)						
BMI <25	1 (ref)		1 (ref)		1 (ref)	
BMI 25-29.9	1.46 (1.10, 1.94)		1.21 (0.92, 1.59)		1.75 (1.33, 2.31)	
BMI ≥30	3.05 (2.16, 4.32)		1.62 (1.15, 2.27)		3.54 (2.52, 4.98)	
Physical activity						
>5 days/wk	1 (ref)		1 (ref)		1 (ref)	
≥5 days/wk	1.35 (1.05, 1.73)		1.07 (0.83, 0.36)	1.69 (1.09, 2.62)	1.24 (0.97, 1.57)	

AOR– Adjusted Odds Ratio, CI – Confidence Interval, m – male, f - female

*Two odds ratios are reported for covariates where the associated estimates vary across the logit equations; one odds ratio is reported for covariates where the proportional odds assumption was not violated

DISCUSSION

In this cross-sectional, population-based syndemics study, we examined the clustering of and synergistic interactions between frequently occurring non-communicable conditions among adults in a Dutch former fishing village. Three disease clusters were found to be most prevalent in this village, involving combinations of psychological distress, cardiometabolic diseases and musculoskeletal pain. We showed that the three diseases interact in mutually exacerbating ways, meaning that these combinations of non-communicable diseases lead to a much lower self-rated health than would be expected based on their independent contributions to self-rated health. We also showed that these three disease clusters were not only associated with age; our findings indicate that they were also more likely to occur among people, particularly women, whose health is impacted by financial stress and increased body weight. Lastly, people suffering from psychological distress in combination with either cardiometabolic disease or musculoskeletal pain were more often not engaged in paid work, suffered more from loneliness, and scored low on physical activity.

Overall, our findings add to the body of knowledge on depression and diabetes syndemics among populations that experienced social and economic hardship (McCurley et al., 2019; Mendenhall, 2012, 2016; Mendenhall et al., 2017). Our study provides a unique empirical test of biological-biological and biological-social relationships of non-communicable conditions in the general population. While the underlying pathophysiological mechanisms for synergistic interaction could not be determined through this study, previous studies have argued that interaction between depression, cardiometabolic conditions, and musculoskeletal pain is most likely associated with a systemic inflammatory dysregulation (Lamers et al., 2020; Milaneschi et al., 2020; Nikiphorou et al., 2019; Yazdi et al., 2019), which has been linked to stress, possibly from the prenatal phase onwards (Goldstein et al., 2019), and is believed to destabilize the autonomic nervous system and dysregulate immune response (Joynt et al., 2003; Narasimhan & Campbell, 2010). Building

on fishermen health studies (Matheson et al., 2001; Woodhead et al., 2018), Slagboom (Slagboom et al., 2020:2) argued that communities like Katwijk are likely vulnerable to such adverse disease interactions "because of their history of harsh working conditions, occupational hazards, as well as the adverse socioeconomic conditions in which fishermen communities typically lived, characterized by income uncertainty and poor access to health care". In a previous syndemics study in Katwijk (Slagboom et al., 2020), following the identification of psychological distress, cardiometabolic conditions and musculoskeletal pain, life events and contextual factors were examined more closely, using a life-course approach and qualitative methodology. This study showed that people suffering from these diseases often reported a history of adverse life events beginning in early childhood and that these diseases often restricted the ability to work - a major stressor in a context with a distinct work ethic and sociocultural norms that emphasize perseverance and being strong. Distress over ill health and income was often experienced during home confinement, which might explain the associations with loneliness, limited physical activity and financial stress as reported in this present study.

Direct comparison of our findings with other population-based studies proved to be complex, as most studies in this literature have examined multimorbidity and have focused on older-age populations or clinical samples (Violan et al., 2014). The strong impairing effect of psychological distress combined with cardiometabolic diseases or pain found in this study, however, is consistent with previous studies (O'Neil et al., 2013) (Dominick et al., 2012). A worldwide study in the Lancet, for example, showed that depression combined with other health conditions "incrementally worsens health outcomes compared with depression alone, with any of the chronic diseases alone, and with any combination of chronic diseases without depression" (Moussavi et al., 2007). Interestingly, our study showed that synergistic interaction was not confined to the presence of psychological distress (Molarius & Janson, 2002). The presence of musculoskeletal pain too, increased the odds of poor self-rated health incrementally.

Our findings on contextual factors help to reconcile key findings in (social) epidemiology, which have shown that multimorbidity is a multifactorial phenomenon that is not merely related to elderly age (van Oostrom et al., 2016) (Barnett et al., 2012) (Roberts et al., 2015). Within the field of syndemics, these findings confirm the link between an early onset of disease clustering, socio economic position and gender as described in previous qualitative studies of depression and diabetes (Mendenhall, 2012; Mendenhall et al., 2017). In line with another study of disease clustering in a welfare state setting, our findings point at heterogeneity in contextual factors (2012), which are partly dependent on the disease cluster concerned.

Limitations

Limited causal conclusions can be drawn from this study given its use of cross-sectional self-report survey data. Self-report of presence and history of conditions has been questioned for accuracy of estimating (true) prevalence of diseases and critiqued for limiting comparability with other studies. Further, the study results could be biased due to voluntary response, oversampling of the working age population and combining of multiple data sets.

While more research is certainly needed to verify the reported patterns, the measurement of conditions, including psychological distress, might be quite accurate and useful for syndemic research in contexts like Katwijk where help seeking is often delayed and underreporting of health conditions is common (Slagboom et al., 2020).

Because of the cross-sectional design, we could not draw inferences about causality, directionality or temporality of the contextual factors. As such, we could not fully explain how these factors act and why contextual factors act differently depending on specific disease combinations. No evidence for an association, however, does not necessarily imply the absence of a relation, this is especially true for factors which are well documented in studies of fishermen health and could have contributed to the development of disease earlier in life, such as heavy drinking and smoking. While our findings indicate

that it is possible to test the three tennets of syndemic theory using routine data, our findings underscore the need for more longitudinal and mixed methods research, including more refined measurements of context, to come to a better understanding of adverse disease interaction on a population level.

Conclusion

Psychological distress, cardiometabolic diseases and musculoskeletal pain were found to interact in mutually exacerbating ways, leading to a much lower self-rated health than expected. Adverse disease interaction between these conditions is likely to be shaped by multiple social conditions, including gender, financial stress and loneliness.

Our findings suggest that musculoskeletal pain is a useful focus for future syndemics research, for example in other populations with a strong history or shift to "blue collar" occupations that do not require a college degree, in which a high prevalence of chronic pain, opioid medication treatment, disability, and substance use disorders has been documented (Case & Deaton, 2015; Krueger, 2017; Venkataramani et al., 2020). Such research needs to incorporate a historical and placed based approach, amongst others focusing on working conditions and power relations.

The social interconnectedness of diseases and context as shown in this study emphasize the need to analyse pathways to non-communicable or 'lifestyle related' diseases outside a discourse of "responsibilization" (Giesler & Veresiu, 2014; Manderson & Warren, 2016). Our findings support that syndemic vulnerability is unlikely to be fully addressed with approaches such as medical screenings and treatments or public health interventions that target individual behavior change (Singer et al., 2020). Instead, a multicomponent, ecological approach is needed, which integrates interventions directed at different domains and educates policymakers and care professionals about the social interconnectedness of psychosocial wellbeing, cardiometabolic and painful conditions.

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AUTHORSHIP CONTRIBUTIONS

MNS: analysis, writing; RR: supervision, reviewing and editing manuscript; ACT: reviewing analysis, reviewing and editing manuscript; FLB: reviewing and editing manuscript; DJAvD: data management, reviewing manuscript; MRC: supervision, analysis, reviewing and editing manuscript.

COMPETING INTERESTS

The authors completed the Unified Competing Interest form at http://icmje.org/disclosure-of-interest/ (available upon request from the corresponding author), and declare no conflicts of interest.

SUPPLEMENTARY FILES

Supplement 1

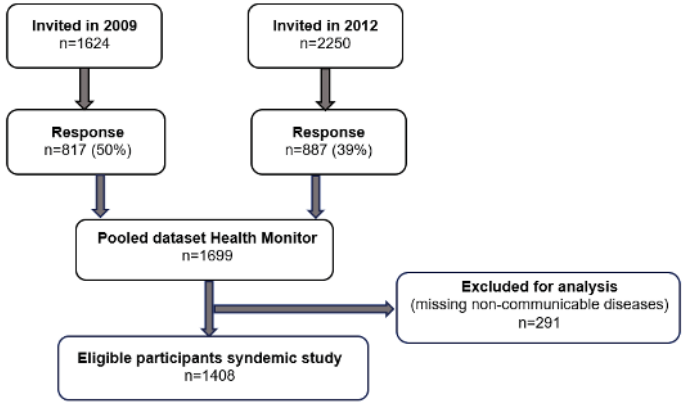


Figure S1 Flowchart Participant inclusion

Supplement 2 Variable description non-communicable diseases

The following seventeen diseases were assessed across the two age groups and two waves of the Health Monitor Survey (2009;2012):

1) Severe or persistent chronic back disorder; 2) severe or chronic neck and shoulder pain; 3) severe or chronic pain in wrist/hand/elbow'; 4) arthritis of hip or knee; 5) 'rheumatoid arthritis'; 6) chronic eczema; 7) psoriasis; 8) asthma, chronic bronchitis, emphysema or COPD; 9) chronic enteritis (> 3 months); 10) migraine or severe headache; 11) venous condition; 12) high blood pressure; 13) coronary heart disease 14) stroke; 15) cancer; 16) heart failure 17) diabetes

In 2009 the conditions were assessed through the following question: "Based on the following list of illnesses and conditions, please tick if you currently have or have had these in the last 12 months": 'Yes, not determined by a doctor'; 'Yes, determined by a doctor'; 'No'. (variable 1-17)

In 2012 the conditions were measured in the following ways: "Please tick if you currently have or have had these in the last 12 months": 'Yes'; 'No' (variable 2-12) or "Have you ever had…" (variable 13-15), followed by "If so, have you had this [disease, red.] in the past 12 months?" 'Yes'; 'No'. Heart failure (variable 16) was measured by asking "Have you had another [other than cororary heart disease, red.] severe heart condition in the past 12 months, for example heart failure or agina pectoris?" 'Yes'; 'No'. Diabetes (variable 17) was assessed by asking "Have you been under treatment or monitored by the general practitioner or specialist in the past 12 months" or "Did you start using insulin within 6 months of your diabetes diagnosis?" 'Yes'; 'No'.

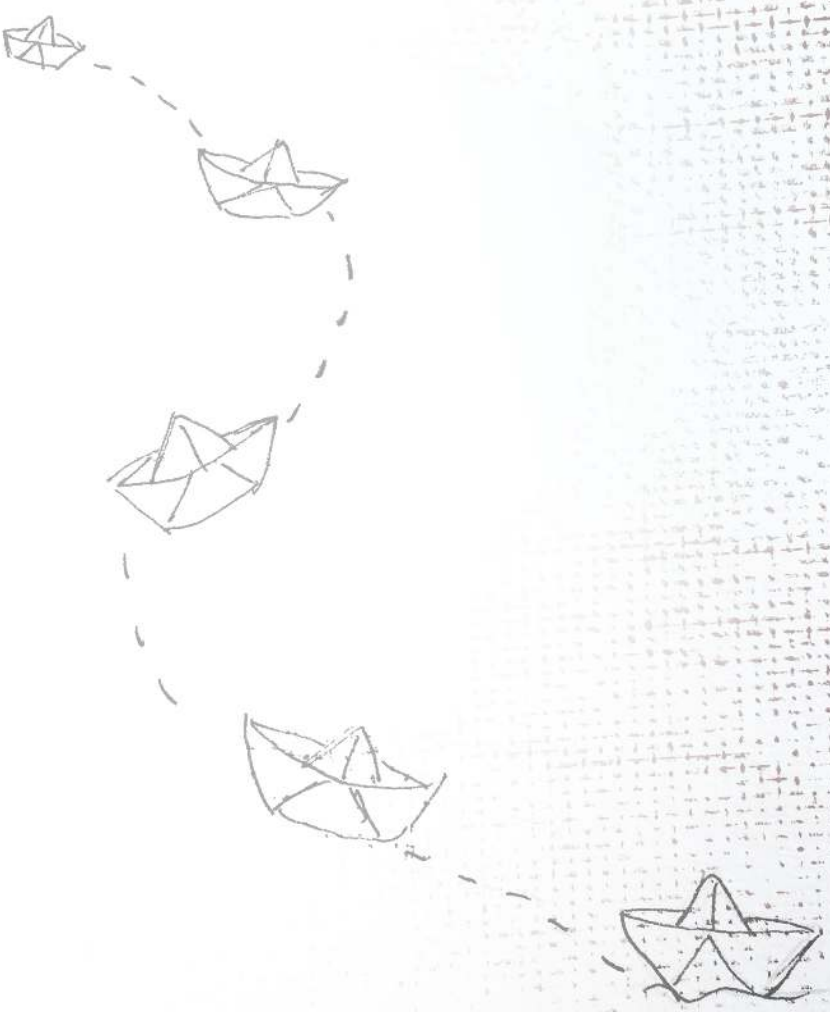
Supplement Table S3 Contextual factors

	Total	No CMD, no PD	CMD or PD	CMD and PD	No Mus, no PD	Mus or PD	Mus and PD	No Mus, no CMD	Mus or CMD	Mus and CMD
	(n=)	(n=)	(n=)	(n=)	(n=)	(n=)	(n=)	(n=)	(n=)	(n=)
Contextual factors	1408	798	510	100	809	475	124	710	485	213
Age (years)										
19-34, %n	17	75	23	3	71	26	3	84	16	1
35-49	22	75	24	1	70	26	5	72	25	3
50-64	25	55	39	6	55	36	9	42	41	17
65-79	31	39	49	12	47	42	13	30	44	27
>80	5	32	42	26	38	35	28	16	48	36
Gender										
Male, %n	46	61	33	6	64	30	6	53	34	14
Female	55	53	39	8	52	37	10	48	35	16
Education										
Low, %n	55	49	41	10	52	36	12	42	37	21
Middle	29	66	30	4	63	32	6	62	29	9
High	17	67	29	4	67	29	4	61	32	7
Civil status										
Married or partnered, %n	78	59	34	6	59	34	8	51	35	15
Widowed or divorced	11	36	47	17	40	39	21	29	46	26
Single	11	61	35	4	66	30	4	71	23	7
Employment										
Paid work, %n	51	71	28	2	67	30	3	68	26	6
Housewife/man	10	54	38	8	51	36	13	40	42	18
Benefits	4	43	43	14	47	33	20	49	35	16
Retirement	36	39	48	13	47	39	14	29	44	27
Financial stress										
No, %n	84	59	35	6	60	33	8	50	35	15
Yes	16	47	41	12	47	38	15	54	29	17
Loneliness										
Low score, %n	65	63	33	3	66	30	5	54	34	13

Supplement Table S3 Contextual factors (*continued*)

	Total	No CMD, no PD	CMD or PD	CMD and PD	No Mus, no PD	Mus or PD	Mus and PD	No Mus, no CMD	Mus or CMD	Mus and CMD
High score	35	45	42	14	43	41	16	46	36	19
Smoking										
No, %n	39	61	32	8	61	31	9	55	30	15
Former smoker	40	51	41	8	55	37	9	42	41	17
Yes	21	60	35	5	58	34	8	60	29	12
Alcohol intake										
<7(f)/14(m) units/wk, %n	78	57	36	7	59	32	9	51	36	14
≥7(f)/14(m) units/wk	22	59	35	7	52	40	8	52	31	18
Body mass index (kg/m^2)										
BMI <25, %n	39	67	28	5	63	29	8	65	27	8
BMI 25-29.9	43	56	37	7	57	35	8	46	39	15
BMI ≥30	18	36	52	12	46	40	14	31	39	30
Physical activity										
>5 days/wk, %n	43	58	37	5	57	36	3	51	36	13
≥5 days/wk	57	56	36	9	58	32	6	51	32	17

CMD – cardiometabolic diseases, MUS – musculoskeletal pain, PD – psychological distress



Chapter 3

Exploring syndemic vulnerability across generations: A case study of a former fishing village in the Netherlands.

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ABSTRACT

Background This qualitative case study uses a life-course approach to explore syndemic vulnerability in a former fishing village in the Netherlands. Building on four years of fieldwork in a low-income neighborhood, we explored salient themes between and across families and generations.

Methods Elderly community members (> 65 years) were interviewed to map village history and explore how contextual factors have affected family life, health, and wellbeing since the 1940s. We systematically traced and compared processes leading to or from syndemic vulnerability by studying seven families across three generations. Adults with at least one of clustering diseases, their parents (when possible), and their children participated in semi-structured life-course interviews.

Findings A complex interaction of endemic social conditions, sociocultural normative processes, learned health behaviors, and disheartening life events shaped families' predispositions for a syndemic of psychological distress, cardiometabolic conditions, and musculoskeletal pain. Educational attainment, continued social support, and aspirational capabilities emerged as themes related to decreasing syndemic vulnerability.

Conclusion and implications This study demonstrates that syndemic vulnerability is potentially intergenerational and reveals the need for culturally sensitive and family-focused syndemic interventions. Future longitudinal research should focus on unravelling the pathogenesis of the clustering of psychological distress, cardiometabolic conditions, and musculoskeletal pain among young people.

INTRODUCTION

It runs on my mother's side. Her sisters are depressed or have been depressed. An uncle of mine, he had it too. He has been in the army and lived through wars. My mother lost her parents at a young age and a lot of brothers and sisters have passed away. So maybe it's everything together… Two brothers drowned while being out on the sea. She was 13 when her mother died and her father died a year later. She was raised by her sisters. That might be a thing that you carry with you the rest of your life. (Jean [pseudonym], 40 years old)

Context shapes the social conditions that cause a population to be vulnerable to disease clustering and interaction (2017). Syndemic scholarship looks at the co-occurrence and synergistic interaction of multiple diseases, while paying particular attention to micro- and macrosocial factors that contribute to disease clustering (Singer & Clair, 2003). The syndemic framework studies how disease clustering, interaction, and dissemination are shaped by human social environments by looking at the "prevailing structures of social relationships […] as well as socio-genic environmental conditions"(Singer et al., 2011:161).

This study is part of a four-year applied research project exploring syndemics in Katwijk, a former fishing village in the Netherlands. In this article, we examine the intergenerational nature of syndemic vulnerability in families like Jean's, who suffer from psychological distress, cardiometabolic conditions, and musculoskeletal pain. Following Ayres et al. (2010), Willen (2017:965) described "vulnerability" in the context of health inequity as "the exposure to a set of conditions that render individuals and communities more susceptible to disease or disability." Building on this definition, we define "syndemic vulnerability" as a predisposition to the development of clustering and interacting diseases or health conditions that result from shared exposure to a set of adverse social conditions.

The story of Jean's family is far from unique; it is estimated that in the European Union, 50 million people suffer from multiple simultaneously occurring

conditions, and that this number is expected to increase further with the rapidly aging population (Navickas et al., 2016; Rijken et al., 2013). Estimates of the prevalence of disease clustering among adults vary widely. This is due to a diverse measure of conditions (Aarts, 2012), including the fact that most studies have only focused on either older people or hospital populations (Violan et al., 2014).

A systematic review of 39 multimorbidity studies observed that the most commonly occurring disease combinations include osteoarthritis with cardiovascular and/or metabolic issues (Violan et al., 2014). There is evidence that depression often clusters with cardiovascular (Whooley & Wong, 2013) or painful conditions (Nerurkar et al., 2018; Stubbs et al., 2016) and an early onset of disease clustering can be linked to socioeconomic status and social conditions (Barnett et al., 2012; McCurley et al., 2019). In addition, a multitude of syndemic studies have described how micro- and macrosocial forces shape vulnerability in the clustering and interaction of mental health and cardiometabolic conditions (Lerman, 2015; Mendenhall, 2016; Mendenhall et al., 2017).

In the Netherlands, an affluent country with a strong welfare state, lower-educated groups have a significantly lower life expectancy at birth (up to 6.5 years) and disability-adjusted life years (up to 15.5 years) as compared to higher-educated groups (The Netherlands Scientific Council for Government Policy, 2018). This unequal distribution of poor health has shown to be persistent over time in European welfare states (Mackenbach, 2012; Mackenbach et al., 2008).

PSYCHOLOGICAL DISTRESS, CARDIOMETABOLIC CONDITIONS, AND MUSCULOSKELETAL PAIN

Dutch maritime communities such as Katwijk were historically known for their close-knit families, limited migration, social stratification, religious traditions, and a distinct social structure where men often worked off-shore for weeks or months, while women stayed on-shore and took care of the family (Deursen, 2011; ter Brugge, 2015). However, due to globalization and climate change, the fishing industry rapidly deteriorated from the late sixties onwards (Deursen, 2011).

Population data from the former fishing village Katwijk presented a complex epidemiological puzzle of physical and mental health outcomes. Among women in Katwijk, yearly mortality rates are higher compared to the rest of the region, and compared to the Dutch population as a whole. More often than not, vascular diseases and psychiatric disorders are the cause of death among these women (GGD Holland Midden, n.d.). A recent multimorbidity study in the Netherlands found that 17.5% of adults suffer from two of eleven self-reported conditions (van Oostrom et al., 2016). In Katwijk, when using the same self-reported chronic physical health conditions, multimorbidity is found to be 22%, which increases to 34% once psychological distress and chronic skin conditions are included (GGD Holland Midden, n.d.; Slagboom et al., 2021).

An epidemiological study conducted in Katwijk shows that the most commonly co-occurring conditions are, respectively, cardiometabolic conditions and musculoskeletal pain (15%), psychological distress and musculoskeletal pain (9%), and psychological distress and cardiometabolic conditions (7%) (Slagboom et al., 2021). After testing the possible disease combinations, the study also showed that psychological distress and cardiometabolic conditions or musculoskeletal pain cluster and interact in mutually exacerbating ways, leading to a much lower quality of life than expected. Disease interac-

tion between depression, cardiometabolic conditions, and musculoskeletal pain is most likely associated with neuroinflammation (Mendenhall et al., 2017; Narasimhan & Campbell, 2010; Nikiphorou et al., 2019), a potentially common biological mechanism, which is described as "a dysfunction of inflammatory production as a reaction to stressful events, dysregulation of the autonomic nervous system, and a destabilizing impact on hypothalamic-pituitary-adrenal axis level dysfunction"(Yazdi et al., 2019, p: 7). In Katwijk, the clusters of psychological and physical health conditions were found to be associated with aging, financial stress, and loneliness, but also with obesity and limited physical activity (Slagboom et al., 2021).

The poor health outcomes observed in Katwijk have also been documented in other fishing communities across the world (Turner et al., 2018; Woodhead et al., 2018). Communities such as Katwijk are likely to be vulnerable to syndemic interactions due to their history of harsh working conditions and occupational hazards (Dolan et al., 2005; Matheson et al., 2001), as well as the adverse socioeconomic conditions in which the people in fishing communities typically live in, such as income uncertainty and poor access to health care (Turner et al., 2019b; Woodhead et al., 2018). Lifestyle factors such as high levels of alcohol consumption, smoking, and poor diet (Woodhead et al., 2018) could also play a role in syndemic interactions.

SYNDEMIC VULNERABILITY IN THREE GENERATIONS

Epidemiological data on Katwijk's youth did not find a clustering of health conditions in the younger age groups. The data, did however, show higher rates of children who were overweight as well as higher rates of smoking, alcohol, and drug use, compared to neighboring communities (GGD Holland Midden, n.d.). Adults who were overweight and had low engagement in physical activity were more likely to have the clustering of psychological distress and cardiometabolic disease or musculoskeletal pain (Slagboom et

al., 2021). There is also evidence from other settings that these behavioral pathways may lead to the development of these condition clusters (Lerman, 2015; Mendenhall, 2016). Moreover, it has been shown that growing up amid parental stress related to income, work, social exclusion, and health increases the likelihood of reporting psychological distress, cardiometabolic conditions, and musculoskeletal pain or poor health in adulthood (Berger et al., 2019; Kivimäki et al., 2018; Layte & McCrory, 2018). In Katwijk, the clustering and interaction of health conditions in adults and the increased prevalence of being overweight or obese and having low engagement in physical activity in both adolescents and adults suggests syndemic vulnerability in all age groups in this community. These cross-sectional epidemiological data do not, however, provide information on families or whether these vulnerabilities were present across generations within a single family.

We use a life-course framework (Elder Jr, 1994; Elder Jr & Shanahan, 2007) to explore the intergenerational nature of syndemics. Although all syndemic studies have looked at the prolonged and multiple effects of social conditions and early adversity on adult health (Herrick et al., 2013; Mendenhall, 2016; Stall et al., 2008), few studies have focused on how local history and prevailing sociocultural normative processes may influence a community's health over the generations. This qualitative case study explores salient themes and patterns related to syndemic vulnerability across families and generations in Katwijk.

METHODS

Given the limited literature on the intergenerational nature of syndemics, this paper builds on a qualitative case study design (Creswell & Poth, 2016), which is the preferential method to contextually understand an issue through the collection of data via multiple methods and sources (Donovan et al., 2011). The study protocol was reviewed by the Medical Ethical Committee of Leiden University Medical Centre, which gave the study a statement of no objection.

DESIGN AND SAMPLE

This study was embedded in the community-based syndemics care project "Levensloopaanpak". The first author conducted fieldwork (e.g. in schools, community centers, churches) among families in a neighborhood with some of the poorest health outcomes in Katwijk from 2015 to 2019. Acceptance and sensitization were facilitated by the researcher's familiarity with local expressions of psychological distress, cardiometabolic conditions, and musculoskeletal pain based on her own personal background growing up in a Dutch Orthodox Protestant community in a family that experienced these conditions.

In the first phase, we collected oral histories to map the village's history and to explore how contextual changes affected family life since the 1940s. These data were gathered through (informal) conversations with elderly key informants (> 65 years) during participant observation sessions in a community center. Seven key informants participated in a formal life-course interview. These key informants also helped contribute to tailoring interview questions to include local expressions of health conditions. In addition, we interviewed local healthcare professionals who regularly interacted with families. Then, we analyzed secondary data sources (local books, newspaper articles, and popular religious magazines) to gather information on local concerns about family life, childrearing, health, and wellbeing. In the second phase, children, parents, and (when possible) grandparents participated in semi-structured, life-course interviews. We used two recruitment strategies through announcements in local newspapers, social media, and flyers: one focusing on the youngest generation and one on the eldest.

Inclusion criteria for families to be eligible to participate in the interviews were: 1) at least one generation had grown up in the designated neighborhood; 2) at least one of the clustering diseases "ran in the family"; and 3) two or more generations were available and willing to be interviewed. Sixteen

families initially signed up for the life-course study, although only seven families met the eligibility criteria for case study analyses (Table 1).

Table 1. Demographics of participants in the family study

Demographics	
Participants (n)	22
G1 – grandparent >68 years	5
G2 – parent <67 years	9
G3 – (grand)child <38 years	8
Gender (n)	
Female	15
Male	7
Ever married	16
Religious upbringing (total, n)	17
G1 – grandparent	5
G2 – parent	8
G3 – (grand)child	4
Years spent in education (mean)	
G1 – grandparent	6.8
G2 – parent	9.6
G3 – (grand)child	12
Family size (mean)	
G1 – grandparent	10.2
G2 – parent	6.1
G3 – (grand)child	4.5

Self-reported health conditions of the seven families were systematically assessed in three ways: 1) by means of initial screening by phone; 2) through an interview guide that allowed the researchers to systematically ask about health conditions and health behavior over the course of the participants' lives (age of onset, duration, presenting symptoms, etc.); and 3) by asking participants to rate their own and their family members' health and wellbeing on a scale from 0 to 10. This score was depicted on a visual scale, followed by interview questions that assessed the guiding principles for definitions of

(ill) health and wellbeing (e.g. "What would be different if your score would be two points higher/ lower?").

After drawing a lifeline to describe life events and medical history, the participants were questioned about the time and circumstances in which these events took place. Where possible, the data was collected about the life history and conditions of the participant's spouse as well. The interviews were conducted at the participant's location of choice, most often their home. After participants read the information letter and signed consent, the interviews were audiotaped. The interviews lasted between 60 and 90 minutes and were transcribed verbatim. NVIVO 11 was used as a tool for analysis.

ANALYSES

We used the four core notions of life-course theory historical time and place, timing in lives, linked lives and human agency to structure our life history interviews (Elder Jr, 1994; Elder Jr & Shanahan, 2007). This framework, developed on the basis of Elder's (1974) study of families of the Great Depression, has been widely adopted to disentangle how "health trajectories shift up or downward" among historically socioeconomically disadvantaged families and populations (Jones et al., 2019). The notion of *historical time and place* addresses how individual lives are embedded in and shaped by historical processes and geographical factors. This notion allowed us to map shared exposure to social conditions and study the context in which life events occurred. The notion of *timing in lives* considers the differential impact of life transitions and events contingent on when they occur in a person's life. This notion guided the analyses of age, year, and developmental phase in which a life event occurred. The notion of *linked lives* speaks to the social networks through which individuals are linked and how these links express historical influence. This notion was used to explore the social circumstances and relations at the time of the event. Finally, the notion of *human agency* directs the

gaze to how individuals construct their own life courses through the choices and actions they take within the opportunities and constraints of history and social circumstances. With a special interest in predisposition that could contribute to the development of psychological distress, cardiometabolic conditions or musculoskeletal pain, this notion was also used to explore guiding norms and values in socialization.

The data were analyzed for salient themes and patterns within and across families and generations, following the three steps outlined below:

1. Open coding of life histories and fieldnotes
2. Thematic coding and sequential analysis of life histories
3. Comparison of themes and patterns within and across families and generations

The first author coded the interviews for life and health events and transferred these into visual life lines (Appendix 2). The research team jointly reviewed transcripts and engaged in reflexive dialogues over the course of three years, which resulted in a code book based on the life-course framework. The first author and three research assistants performed a second thematic coding of all the data using this code book.

FINDINGS

One participant, Franky (70) introduced her life history by stating: "I have always been very strong" and, "You could write a book about my life." Her life started during the famine and housing crisis of World War II. Like most elderly participants, she was born into a large family in which women took care of the children and the home while the men fished off-shore for weeks or months at a time. The family's income and food intake strongly depended on the fishing season and the catch. Life was particularly challenging in the cold winter months when fishing was interrupted and families lived off of savings and temporary jobs. The eldest of 11 children, Franky grew up in a

home with a "harsh" mother who suffered from poor health. The family lost two children due to stillbirth and illness. Franky (70) linked growing up with an ill parent to her childhood experiences of care taking, frequent school absences, and always feeling tired. At the age of 12, much against her wishes, she was pulled out of school to take care of her siblings. Her life line shows how this transition coincided with her early uptake of drinking and smoking, as well as meeting her future husband, a young fisherman with a history of severe childhood abuse.

At 16, Franky became pregnant out of wedlock, which enraged her mother and resulted in a hasty move with the father of her child to her in-laws' attic. After giving birth without her family's support, she moved between temporary houses and got married at the age of 17. To her dismay, her husband, like his father, became an alcoholic. From then onwards, she describes a decade of continued stress due to worries about housing, her and her child's safety, and her husband's alcoholism and infidelity. These worries were exacerbated by severe financial stress related to her husband's unemployment, as a consequence of the nationwide fishing ban in the seventies. Franky gained weight after giving birth to her first child (at 17 years) and suffered from gestational diabetes during her second pregnancy (at 19 years). While raising her children, she suffered from musculoskeletal pain, type 2 diabetes, and severe psychological distress:

> *I laughed, but cried on the inside. […] I cried at night, by myself. I wouldn't tell my children, but there were times in which I thought, "What kind of life is this? I think I will jump into the river, drown myself." But I couldn't, I had three children with a drunkard. […] I stayed with him thinking, "He will leave for fishing tomorrow, [he will be away] for three or four weeks." I was lucky that he was gone a lot. I never took pills for nerves. I was able to manage everything by myself. I tried to be my own doctor.*

A CONTEXT FOR SYNDEMIC VULNERABILITY

Our study reports the general themes and patterns that emerged from the analysis of twenty-seven life histories and notes from participant observation among grandparents, parents, and children who self-reported psychological distress, cardiometabolic conditions, and musculoskeletal pain in a former fishing village in the Netherlands.

As shown in Table 1, grandparents (G1) grew up in the aftermath of World War II, parents in the 1970s (G2), and the youngest generation (G3) in the (late) 1990s or early 2000s. Figure 1 shows the national and local context between 1940 and 2016—the time span in which the participants grew up. The top half of the figure illustrates the macro-level state of affairs based on a desk review and interviews, while the bottom half reports micro-level changes based on interview data. Appendix 2 illustrates the life histories of three generations that grew up amid these changes.

While the individual life histories of the participants differed in many ways, all narratives echoed the local history of fishing, Orthodox Protestant religion, and rapid industrial restructuring (Deursen, 2011; ter Brugge, 2015). Our study concentrates on common emergent themes in relation to syndemic vulnerability over the course of three generations.

The following sections report on four complex interacting themes: 1) social conditions, 2) sociocultural normative processes, 3) health behaviors, and 4) adverse and early life events. All names in the study are pseudonyms, and occasionally, characteristics of participants have been altered or combined to maximize anonymization.

World War II, 1940–1945
- Society: social class division
- Work: fishing fleet confiscated or destroyed
- Work: young men sent to Germany
- Death of (young) men in combat or at sea
- Housing: severe damage (+1000)
- Famine

Post-war reconstruction, 1945–1965
- Work: motorization and decline of traditional fishing jobs
- Work: urbanization and decrease in farm land
- Housing: severe scarcity
- Housing: new rental apartment blocks
- Education: compulsory > 12
- Health care: national immunization

1970s
- Work: herring fishing banned
- Work: new jobs in construction, painting, flowers
- Education: compulsory > 16
- Introduction of birth control
- Secularization
- Second wave of feminism
- Universal healthcare insurance

1990s
- Work: fishing quotas and outsourcing
- Housing: new properties on the outskirts of town
- Education: tracking, tuition subsidies

Family life
- Fathers: seasonal absence
- (Grand)mothers: childrearing
- Families: loss of fathers/brothers
- Families: war-related trauma
- Families: (seasonal) poverty and food insecurity
- Families: cramped, poor housing
- Religion: (Orthodox) Protestantism
- Children: contribution to income *> 8 years*

Family life
- Fathers: unemployment and transition to on-shore industries
- Family: adjustment to daily presence of men/fathers
- Family: Alcoholism in men
- Young couples: living with in-laws or in summer sheds
- Children: contribution to income > 12 years

Family life
- Fathers: unemployment and transition to new jobs
- Young couples: assigned to new housing blocks
- Decrease in family size

Family life
- Fathers: work in new industries
- Mothers: jobs outside the home
- Families: decline in religious affiliation
- Children: first generation learners

Figure 1 Contextual changes and events affecting family experiences in Katwijk

SOCIAL CONDITIONS

Not all elderly participants and key informants faced circumstances as harsh as Franky's, but many reported being exposed to similar childhood conditions._

Grandparents (G1) reported the following early physical, environmental, and psychosocial exposures that could result in vulnerability to psychological distress, cardiometabolic conditions, and musculoskeletal pain. These conditions include: the accumulation of poverty, seasonal food insecurity, unsafety, early loss, parental absence, parental illness, and social marginalization. Another shared youth characteristic was growing up in poor housing, working under harsh conditions, and lack of availability to health care. This generation also commonly reported an early uptake of drinking and smoking, and often spoke of socialization that emphasized showing perseverance, being strong, keeping silent, being obedient, and "handling things by yourself."

Working beyond one's strength

The themes of hard work and being strong emerged as explanations for the clustering of psychological distress, cardiometabolic conditions, and musculoskeletal pain.

These explanations were frequently discussed while stressing a distinct, local work ethic, which has also been documented in previous studies of this population (Deursen, 2011; El-Karimy, 1999). Singer (2009 :20) referred to such local knowledge and beliefs as "folk syndemics." Gertrude (64) for example, explained why "Katwijk suffers from 'broken backs' [gebroken ruggen]":

> *They are loyal and hard workers. […] We always work beyond our strength. In the old days, you had to. The harder you worked, the more you earned. On board, you would not admit that you couldn't lift something.*

Shirley (72) spoke about hard work while referring to brutal working conditions:

> *They [men] were only children when they [first] left for the sea. It was a hard life. They continuously worked shifts of two hours: two hours work, two hours rest. They never got out of their clothes. This could go on for weeks.*

The women most often spoke about physically straining household work. Mae (80), for example, recollected working as a maid:

> *There were no mops or brooms. One had to get down on the knees on the floor for everything and the washing was done outside. We weren't allowed to eat at the dinner table. Food was served through a hatch for servants, as if we were prisoners!*

The high premium put on work and the norm of perseverance was also reflected in the way the participants discussed experiences with illness. Mabel (72), for example, said:

> *We were always used to taking care of business ourselves. When we got sick, we coped. [...] I am tough on myself. […] Even now [that I am suffering from back aches] I can't stop working.*

Contextual changes and continuities

Fig.1 summarizes contextual changes from the 1960s onwards, showing how the decline of fishing in Katwijk occurred in the same decade as the expansion of the modern welfare state. Examples of such social security reforms were the introduction of universal health insurance in 1964, unemployment and disability benefits in 1963 and 1966, and compulsory education until the age of 16 in 1969 (Cox, 1993; Luijkx & de Heus, 2008).

Reflecting on the enormous social changes in the 20th century, grandparents (G1) came of age in a very different sociohistorical context than their children, the parents (G2) in our study. Whereas, in World War II, occupational hazards and poverty were central in the grandparents' life histories, mass unemployment and the fishing ban (Deursen, 2011) were pivotal in the parents' generation.

A comparison of the life histories of the men (G1 and G2) shows a shift from employment in the fishery, to employment in physically straining and often temporary jobs, such as painting, road building, or truck driving. It was not uncommon for the men (G2) to work two or three jobs, extending into the evenings and weekends. This observation is supported by Deursen's (2011) study of Katwijk between 1940 and 2005. Mabel (72) spoke about these changes and how they affected family life:

> *First, there was very little fish to catch, in the '70s. A very bad time. It all really changed when the fishing quota came about in the '80s. One by one they lost. The boys shifted to other work: flowers or building. Most of them became builders. […] It was a big change for women, too. All of a sudden, the husband was home every evening. That is when the divorces came in.*

Men (G2) in this study frequently spoke about a high disease burden related to (temporary) unemployment or periods of extended sick leave. Herbert (48), for example, started working as a painter at age 15, a job in which he was exposed to toxic paint fumes. After working in multiple jobs with adverse working conditions, he switched to construction in his 20s. His life history showed multiple sick leaves due to unexplained headaches, dizziness, and back pain. Another man (G2), Stan (45), spoke about worries related to his unexplained hypertension. This prohibited him from working as a truck driver and getting life insurance and a mortgage, and caused him to constantly feel anxious about his health. He stated, "It messes with your head".

HEALTH BIOGRAPHIES

Parents continued to grow up with a greater emphasis on working hard and being strong. Related to showing perseverance, socialization also emphasized keeping quiet about one's suffering. Franky's daughter, Susan (50), summarized this lesson as: "[If] we don't talk about it, it isn't there." Stan (45) explained that this norm extended to keeping quiet about health-related stress: "People who have those complaints [from the cluster] will not be too talkative."

Much like Franky, families in the study often discussed their health conditions using local, descriptive terms. Local expressions included "having sugar" (diabetes), "being sturdy" or "being a healthy Dutch girl" (obesity), and having "a worn down back" or "having it in your back" (pain). Descriptions of episodes of psychological distress regularly included an element of fatigue and musculoskeletal pain that required extended bedrest. For example, across generations, the participants referred to episodes of "plat liggen" which literally translates to "lying down flat," a term that could refer to psychological distress, as well as severe musculoskeletal pain. It was frequently discussed that doctors could not "explain or treat" this suffering, despite repeated healthcare visits.

You didn't know better

As for health behaviors, biographies of parents (G2), such as Herbert (48) and Stan (45), showed a pattern of an early uptake of smoking and drinking: "I had my first drink when I was 12." Much like the G1 participants, G2 participants regularly attributed the early onset of these health behaviors to growing up in an environment in which the behaviors were very common: "You didn't know better."

In this study, it was uncommon for parents (G2) to engage in sports throughout childhood. Parents often answered questions about regular physical exercise in their youth by referring to economic restraints or sociocultural

normative processes that valued working over play. Stan (45), for example, said: "I grew up in an ordinary family of workers. They didn't consider talents. What mattered was money. There was no money for such things as sports."

Changes in health behavior were most commonly attributed to a transition to parenthood or critical health events. Stan (45), for example, ceased smoking and took up regular exercise after his first cardiovascular event. Franky's daughter, Susan (50), discontinued drinking after becoming a mother; she referred to experiences of growing up among heavy drinkers: "It was common for fishermen to drink, it was just how it was. Everybody knows. I don't drink, not one drop. I have seen the damage it can do."

This pattern in health behaviors was largely discontinued in the third generation (G3). Children commonly mentioned growing up with family rules that strictly prohibited smoking and underage drinking and participated in physical education in school. Some children recollected occasional smoking and heavy drinking in their early adolescence: "I don't think my parents ever knew." Much like their parents, these behaviors were often discontinued after transitioning into a long-term relationship.

Patterns in syndemic vulnerability

From the parents' generation (G2) onwards, two patterns of syndemic vulnerability emerged (Appendix 1). The first pattern showed sustained syndemic vulnerability across generations: both grandparents (G1) and parents (G2) self-reported multiple diseases from the cluster. In line with the youth epidemiological data of Katwijk, the third generation (G3) did not report multiple diseases from the cluster of psychological distress, cardiometabolic conditions, or musculoskeletal pain. They did, however, suffer from psychosocial distress and musculoskeletal pain or psychosocial distress, obesity, and musculoskeletal pain.

This is illustrated in the life history of Franky's granddaughter, Amber (17), who remembered "being chubby" from age five onwards (Appendix 2).

Shaped by being bullied at school and feeling unsafe in her neighborhood, she preferred to stay indoors. At age 12, she started suffering from severe psychological distress, which was also the time in which she often missed school due to musculoskeletal pain.

Families with sustained syndemic vulnerability recollected an onset of psychological distress, musculoskeletal pain and/or obesity relatively early in life, frequently before the age of 18.

The second pattern showed a decrease from syndemic vulnerability: in contrast to the generation of grandparents (G1), parents (G2) and children (G3) did not self-report multiple diseases from the cluster of psychological distress, cardiometabolic conditions, and musculoskeletal pain (Appendix 1). Lizzy (24), for example, spoke about being obese at the age of 18. She attributed her weight gain to her and her friends' lifestyle of partying and heavy drinking during their first years of college. At the age of 20, in the same year she met her future husband and started a new job, she reports an uptake of regular exercise and, as a result, losing weight.

LIFE EVENTS

In response to the questions "Which events in your life were important to you?" and "Could you tell me something about the highs and lows in your life?", families recollected transition events (e.g. the birth of sibling, marriage, changing jobs), as well as critical or adverse events (e.g. unemployment, sudden loss of a loved one). While all biographies echoed local history, the participants' histories diverted most strongly along the lines of type, duration, and impact of the life event. In relation to syndemic vulnerability, two patterns of life-event characteristics emerged across generations and families: a pattern of cumulative stress throughout life and a pattern of singular, short stressors.

Cumulative stress

Families that reported psychological distress, cardiometabolic conditions, and musculoskeletal pain across generations commonly spoke about a "difficult childhood." Stressors included a combination of social exclusion, violence, parental illness, alcoholism, and parental absence. These experiences were often discussed in implicit terms: "I grew up in a family of heavy drinkers."

It was also common to observe a repetition of short, educational trajectories and "early" integration into the labour market in G2, which participants linked to socialization that emphasized work, not being able to focus (men), and frequent school absences related to musculoskeletal pain and fatigue. Much like the grandparents (G1), parents (G2) grew up in an environment that emphasized being strong and keeping quiet about suffering. Susan (50), for example, said: "In that time, one simply didn't talk about it."

Parents (G2) commonly referred to the hindering effects of past (health) events on their life trajectories, as illustrated in Herbert's (48) history:

> *I didn't really have a warm home, as a child. […] My father cheated. My mother swallowed it all thinking: "I have five kids after all; they need to be fed." […] My mother was really mostly only sad. I would see my parents fight, as a young child, if he was home. That naturally scares you. I think that has been a part of my mental health problems, how these evolved. It is connected to those complaints [pain] and my depression. My youth, it's all a part of it. [...]*
>
> *Like my daughter, I was also a bit of an outsider. I would engage with other boys who were bullied. […] I didn't finish high school. I couldn't wrap my head around it. It was not such a smooth time [at home]. Maybe it is connected. I just couldn't study.*

The pattern of cumulative stress was observed throughout his life; parents (G2) frequently spoke about a combination of worries related to work, income, and health from their late adolescence onwards. At age 16, Herbert met his partner, Grace, who too experienced "a very difficult childhood." At this age, he also started suffering from "anger explosions," which were augmented by back and neck pain from his early 20s onwards.

> *It could have been because of inhaling [toxic] fumes, or because of my breathing—I felt so sick. I also got explosions of anger. […] The hyperventilation kept coming back. […] The pain runs in our family. […] I worked in construction, which included hard, laborious work. I got it in my back, which repeated every year. It only got worse, there was nothing to be done. There were times that I couldn't sit, I could only lie down, I was in terrible pain.*

For women, these processes are best illustrated in Grace's (45) life history. Much like her mother, her life started in a family that mourned over the sudden loss of a young child. She recollects a childhood in close proximity to her mother, being bullied at school, and suffering from unexplained fatigue that led to frequent school absences between the age of 10 and 12. At the age of 15, she started working as a cleaning maid, which she linked to the prevailing idea that "women are destined to get married and have children":

> *I wanted to be a nurse […] Back in the '70s, you weren't heard. Nowadays, you talk to your kids and search for their talents. In my time, the reasoning was "your sister went to household school, so should you." I could have gone much higher.*

Following her first pregnancy (at 21 years), she started gaining weight. In roughly the same years that her husband was homebound due to a severe work accident, she was confined to years of bedrest while her mother took care of their newborn. She has been suffering from severe, medically unexplained multisite-musculoskeletal pain ever since. At times, she regrets not

having been able to care for her son in his first years: "Sometimes I feel like he isn't my child, as he was raised by my mom."

The pattern of "a difficult childhood" was partly continued in the third generation (G3). Herbert and Grace's children continued to grow up amid insecure income and parental illness while experiencing social exclusion and scholastic difficulties. Explicit references to violence or alcoholism in the nuclear family, however, were rare among this generation. Different from their parents, children in this study grew up in a family environment that stressed the importance of education and obtaining "a good degree". Much like Amber (17), children continued to self-report early psychosocial stress, childhood obesity, and/or fatigue and musculoskeletal pain.

Breaking the cycle

From the parents' generation (G2) onwards, some families showed a break from the cycle of adverse early circumstances. The life histories of these families showed a pattern in which adverse events occurred as singular, distinct events, often *after* adolescence.

Joe's (58) biography exemplified such a life history. Following in his family's footsteps, he could have joined his uncle's workplace at the age of 14. Instead, he continued his education while working side jobs. He attributed the trajectory of his life to aspirations, curiosity, and choice of partner: "I married someone from another town; she was educated. [...] I would tell my children: 'Study! Make sure you get a degree!' and my wife would say the same: 'Study!' " In families with decreasing syndemic vulnerability, parents and children, commonly referred to choices and aspirations that enabled their educational and social mobility.

DISCUSSION

This qualitative case study is one of the first to systematically explore the intergenerational nature of syndemic vulnerability. We defined syndemic vulnerability as "a predisposition to the development of clustering and interacting diseases or health conditions that results from shared exposure to a set of adverse social conditions" and examined salient themes and patterns across families and generations.

The findings from this study contextualize the results from an epidemiological study in Katwijk (Slagboom et al., 2021) in showing that syndemic vulnerability in this population is likely produced under conditions of continued exposure to adverse social conditions, childhood experiences, and shared sociocultural norms of perseverance. Worldwide studies support that the emotional burden of loss, seasonal income, occupational hazards, rapid socioeconomic changes, and ill health extend to the broader fishing community (Dolan et al., 2005; King et al., 2015; Smith et al., 2003). The profound impact of environmental and socioeconomic restructuring on adult health outcomes has also been described in other syndemic studies (Singer, 2009 ; Willen et al., 2017).

Although our results help to reconcile key findings in life-course studies (Godfrey et al., 2010; Melchior et al., 2007; Poulton et al., 2002) and syndemics (Herrick et al., 2013; Mendenhall, 2016), they do not fully explain the asymmetry of syndemic vulnerability given the nationwide availability of health care and education since the policies implemented in the late 1960s. In what follows, we explore the classic question of: "Why some grow up well while others don't" (Panter-Brick, 2014) in relation to current insights on the transmission of stress and resilience.

By looking at families with sustained syndemic vulnerability, it was observed that in contrast to the older generations, the youngest generation (G3) reported similar disease clustering without having been directly exposed

to harsh working conditions, violence, alcoholism, or parental absence. Previous studies have shown that such disheartening experiences might have ramifications well beyond the event itself (Danieli, 1998; Lev–Wiesel, 2007; Yehuda et al., 2001). Grandparents' exposure to adverse social conditions and trauma could shape how children, much like their parents, consciously or unconsciously respond to cumulative and unpredictable stress in the family environment (Akello et al., 2010; Dickson-Gómez, 2002; Guthrie, 2008). Intergenerational syndemic vulnerability is potentially a product of historical trauma (cf. Denham, 2008). This possibility is substantiated by our observation of how adverse life events such as abuse, violence, alcoholism, and parental absence were discussed. In their work on historical trauma response, Labanyi (2009) and Denham (2008) described similar ways of speaking about suffering, such as joking (2009) and emphasizing ones strength while avoiding elaboration on the adverse life event itself (2008).

Observations of families with decreasing syndemic vulnerability indicate that processes leading to syndemic vulnerability can be countered. While all parents_in the study grew up with the challenge of unemployment, only those who completed their education moved on to secure jobs and better housing. While discontinuations in family health cannot be attributed to a single determinant, it has been shown that educational attainment (Kuntz & Lampert, 2013), as well as moving to economically better-off areas (Chetty et al., 2016; Ludwig et al., 2011), is linked to better health outcomes. It is, however, questionable whether the provision of educational and housing opportunities in itself are sufficient to counter the effects of cumulative stress, resist familial patterns, or change health behaviors. Only those who reported the continuing availability of social support, as well as aspirational capabilities, were able to pursue further education despite the emphasis on work and prevailing age or gender expectations. This confirms previous syndemic studies that showed that education, social support, and optimism are likely to strengthen individuals' capabilities to enhance their own well-being and negotiate adversity (Adeboye et al., 2017; Reed & Miller, 2016). Rather

than a static health status, our study suggests that syndemic vulnerability is dynamic and possibly temporary.

This study does not come without limitations. Due to the difficulties of getting families to participate in the study and our strict inclusion criteria, we based our analyses on a small, purposefully selected sample of participants. The strength of this approach, however, is that it allowed for an in-depth, thoroughly contextualized exploration of experiences that are difficult to document and treat due to "silence" in families. The findings might aid healthcare providers who struggle with low uptake or adherence to interventions for highly prevalent conditions, such as obesity or psychological distress. Another limitation to this study is that we relied on self-reported conditions and recall. We did not have access to medical records and the life histories were not paired with psychiatric inventory or biomarker data, as previous syndemic studies have been. In speaking about health conditions, the line between psychological distress, musculoskeletal pain, and fatigue was often unclear; however, descriptions of psychological distress that include musculoskeletal pain have been widely documented (Bair et al., 2003). Rather than pointing to this as a weakness, we believe the lack of boundaries between these conditions demonstrates the synergistic interaction between diseases, which is the basic tenet of syndemic theory.

Research into the intergenerational nature of syndemics is tremendously complicated, as the complex interplay of time, place, and biological, social, and behavioral pathways must be taken into account. Building on a well-established theoretical framework for life-course research, our exploratory study did not look at causality nor biological pathways, but rather, focused on emerging themes and patterns within life histories. The processes that emerged from this in-depth qualitative case study need to be tested in a large-scale study of syndemic vulnerability in families that faced rapid contextual changes.

CONCLUSION

This study demonstrates that syndemic vulnerability is potentially intergenerational. Multigenerational syndemic vulnerability might result from a complex interaction of endemic social conditions, disheartening life events, health behaviors, and sociocultural normative processes. Resilience can be hampered under social exclusion, and can flourish with social support, educational attainment, and self-regulatory capabilities. The observation that syndemic vulnerability can be temporary and countered is a hopeful message for the dreams of children who grew up under challenging conditions.

The multigenerational presence of disease clustering in Katwijk underscores the need for longitudinal and mixed-method research into the pathogenesis of syndemic interactions in families. Our findings show that even in a setting with well-established and generally accessible health care, the early detection and treatment of psychological distress may be hampered by locally idiosyncratic expressions of distress. This underscores the need for more research into idioms of distress in syndemics, as well as culturally sensitive and family-focused syndemic care. This could promote opportunities to take family history and dynamics into account in lifestyle adjustments or medical treatment. Future participatory studies are required to explore how care providers can integrate such a community based and family focused approach. To further the study of context, the field of intergenerational transmission of health and historical trauma is worthwhile of consideration in future syndemics research.

Finally, our data on decreasing syndemic vulnerability suggest that more research is needed to identify processes that strengthen resilience and can counter syndemics and its transmission.

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AUTHOR CONTRIBUTION

Nienke Slagboom: Investigation, Formal analysis, Writing- original draft. Matty Crone: Funding acquisition, Supervision, Writing- Reviewing and Editing. Ria Reis: Funding acquisition, Supervision, Writing- Reviewing and Editing.

DECLARATION OF INTEREST

None.

SUPPLEMENTARY FILES

Appendix I

Conditions grandparents (G1)

Family	Conditions grandparents G1	Causes of early losses
1	Psychological distress, cardiometabolic disease	Psychological distress Cardiometabolic condition 'Unknown'
2	Psychosocial distress, musculoskeletal pain Psychosocial distress, condition due to toxic fumes	Cancer
3	Psychological distress, cardiometabolic disease, musculoskeletal pain,	Intestinal condition
4	Musculoskeletal pain and 'many other things' "Nothing" Musculoskeletal pain and cardiometabolic disease	Pneumonia Kidney condition
5	Psychological distress, musculoskeletal pain, cardiometabolic disease	Accident Cancer
6	Psychological distress, cardiometabolic disease, migraine, cancer Cardiometabolic disease	Cancer Cardiometabolic condition
7	Psychological distress, grief Cardiometabolic disease, grief	Cancer (2x) Accident (3x) 'Unknown'

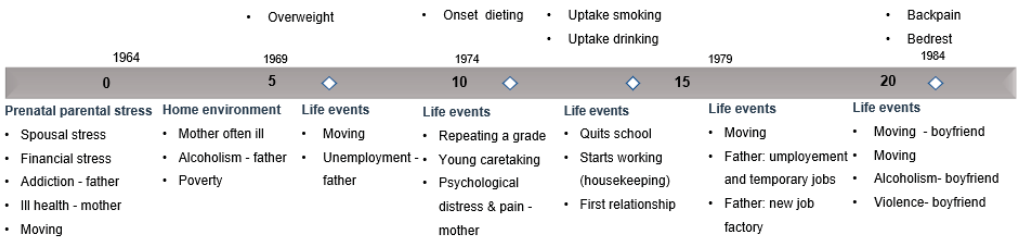
Conditions Parents and Children (G2 and G3)

	Case	Conditions parents G2	Conditions children G3
Sustained syndemic vulnerability			
	1	Psychological distress, musculoskeletal pain, respiratory problems	Psychosocial stress, musculoskeletal pain
	2	Psychological distress, musculoskeletal pain, cardiometabolic disease	Psychosocial stress, obesity, musculoskeletal pain
	3	Psychological distress, musculoskeletal pain, cardiometabolic disease	G3- 1 Psychosocial stress, musculoskeletal pain, obesity G3-2 Psychosocial stress, obesity
	4	Psychological distress, musculoskeletal pain, obesity, migraine, fatigue	Musculoskeletal pain, obesity, migraine, fatigue, intestinal complaints
Decreasing syndemic vulnerability			
	5	Cardiometabolic disease musculoskeletal pain	Obesity*
	6	Musculoskeletal pain	Psychosocial stress, musculoskeletal pain*, obesity*
	7	Cardiometabolic disease, respiratory problems	

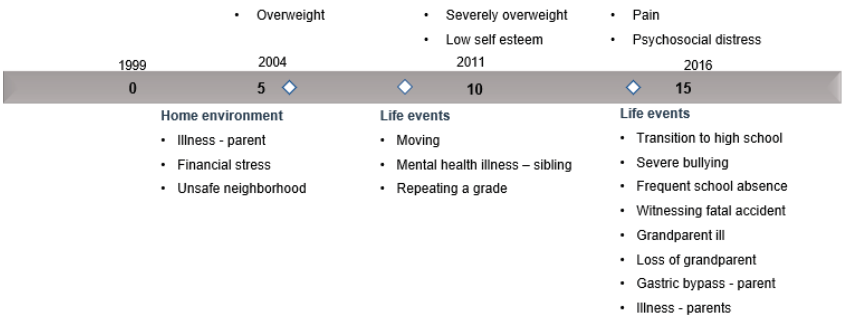
* Indicating a past, temporary condition

Appendix 2: Adverse life events and early onset of conditions in three generations

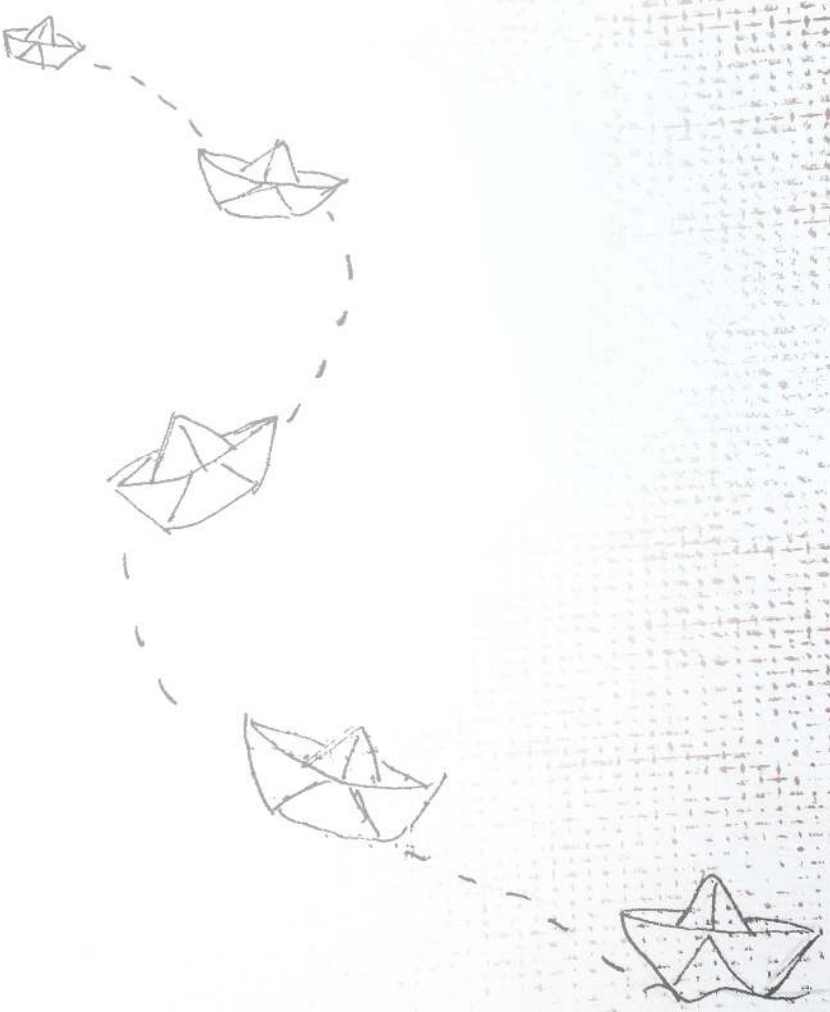
Life history mother Susan (G2)



Life history granddaughter Amber (G3)



◇ = co-occurrence of life and health event



Chapter 4

The evaluation of a family-engagement approach to increase physical activity, healthy nutrition, and well-being in children and their parents

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ABSTRACT

Background Prevention programs often are directed at either parents or children separately, thereby ignoring the intergenerational aspect of health and well-being. Engaging the family is likely to improve both the uptake and long-term impact of health behavior change. We integrated an intergenerational approach into a frequently used shared assessment tool for children's care needs. The current study's aim was twofold: to monitor this family-engagement tool's effects on both children and their parents' health behaviors and well-being, and to examine the different dynamics of health behavioral change within a family.

Methods We followed 12 children ages 10–14 years and their parents for 12 weeks using an explanatory mixed-methods design comprising interviews, questionnaires, and an n-of-1 study. During home visits at the beginning and end of the study, we interviewed children and their parents about their expectations and experiences, and measured their height and weight. Furthermore, we collected secondary data, such as notes from phone and email conversations with parents, as well as evaluation forms from professionals. In the n-of-1 study, families were prompted three times a week to describe their day and report on their vegetable intake, minutes of exercise, health behavior goals, and psychosomatic well-being. The interviews, notes, and evaluation forms were analyzed using qualitative content analyses. For the n-of-1 study, we performed multi-level time-series analyses across all families to assess changes in outcomes after consulting the family-engagement tool. Using regression analyses with autocorrelation correction, we examined changes within individual families.

Results Five child-mother dyads and three child-mother-father triads provided sufficient pre- and post-data. The mean minutes of children's physical activity significantly increased, and mothers felt more energetic, but other outcomes did not change. In consultations related to overweight, the family-engagement tool often was used without setting specific or family goals.

Conclusion The family-engagement approach elicited positive effects on some families' health and well-being. For multifaceted health problems, such as obesity, family-engagement approaches should focus on setting specific goals and strategies in different life domains, and for different family members.

INTRODUCTION

Changing health behavior within families is a well-known challenge (Emily Kelleher et al., 2017; Skelton & Beech, 2011). This study evaluates the use of a family-engagement tool to increase physical activity, healthy nutrition, and well-being in children and their parents in Katwijk, the Netherlands. This former fishing village previously was known for its close-knit families and distinct social structure, in which men worked offshore for weeks or months, while women stayed home and took care of their children (Slagboom et al., 2020). The community has experienced rapid contextual changes over the past five decades due to welfare reforms, climate change, and globalization (Slagboom et al., 2020). Public health data from Katwijk indicates that 21% of 10- and 11-year-olds and 55% of adults in the village are overweight. Among youths, figures indicate early alcohol and tobacco uptake and a dietary intake that is low in fruit (72%) and vegetables (80%), with most youths (84%) not meeting physical activity norms (GGD Hollands Midden; Slagboom et al., 2016). Furthermore, up to 16% of adults are at risk for psychosocial problems (Slagboom et al., 2021). A previous study in Katwijk described an intergenerational pattern of adverse health outcomes that included cardiometabolic conditions, musculoskeletal pain, and psychological distress across generations (Slagboom et al., 2020). Child care professionals persistently have reported low attendance at school-based prevention programs and primary care programs, and underscored the need to take parenting and the family environment into account in children's health behavioral change efforts (Slagboom et al., 2016).

Overweight, a sedentary lifestyle, and psychosocial stress in childhood are associated with adverse health outcomes later in life (Bellis et al., 2019; Dube et al., 2003; Lobstein et al., 2004). Adverse childhood experiences and obesity are associated positively (Bellis et al., 2019; Elsenburg et al., 2017) and have been demonstrated to elicit "long-lasting effects on the neural and biological systems involved in well-being, biomedical disease, social function, and psychopathology" (Felitti & Anda, 2010:77). Therefore, comprehensive

assessment of health and psychosocial stress and uptake through early prevention programs is viewed as critical to improving children's health (Felitti, 2009; Flaherty et al., 2009). Research has found that despite the availability of preventive programs aimed at improving dietary intake, physical activity, and psychosocial well-being, attendance and adherence to these programs are low (Hoeeg et al., 2020; Emily Kelleher et al., 2017).

Parents play a pivotal role by modelling, supporting, and guiding their children's health behaviors (Xu et al., 2015; Yee et al., 2017). Considering that parental involvement is associated with child behavioral outcomes (Enright et al., 2020), parents' involvement in their children's behavioral change is essential (Golley et al., 2011; Middleton et al., 2013). However, despite recommendations to include parents as agents of change in health prevention (Barnes et al., 2020; Berge & Everts, 2011; Novilla et al., 2006), prevention programs often are directed at either changing parents' behavior or changing children and adolescents' behavior separately (Kitzmann & Beech, 2011; Stice et al., 2006), thereby ignoring the intergenerational aspect of health concerns and well-being. Therefore, these programs lack effectiveness in breaking vicious intergenerational cycles. For example, two-generation school programs that provide parents and children with high-quality preventive interventions were demonstrated to be more effective and efficient than programs that served them separately (Chase-Lansdale & Brooks-Gunn, 2014). Bridgett et al. (2015) demonstrated that by improving parents' self-regulation, parenting behavior can be improved, stress decreased, and the familial context enhanced. A simultaneous focus on strengthening children's self-regulation also enhanced family interactions. Working on family goals elicited changes that resulted in positive well-being outcomes among children (Bridgett et al., 2015). Another recent study found that focusing on shared health goals could prevent adolescents from developing depressive symptoms and unhealthy or risk-taking behaviors (Kao et al., 2020).

Involving the setting in which children spend most of their time is likely to enhance health promotion efforts' long-term impact. This is particularly true

in family-focused settings such as Katwijk, where professionals often have reported social problems, health behavioral norms, and low family support as barriers to changing children's food intake, physical activity patterns, and psychosocial well-being. Thus, the first step in improving children's health and well-being is to engage both children and their parents in preventive activities. To this end, we integrated an intergenerational approach in a frequently used and shared assessment tool for children's care needs in child preventive health care in the Netherlands. The tool, *Gezamenlijke Inschatting Zorgbehoeften* (GIZ), assesses children's strengths and needs regarding their health and well-being, as well as empowers them to set goals and create plans to manage their needs. The GIZ engagement tool has been demonstrated to elicit positive effects in discussing parenting and social circumstances, parent-health professional agreement, and parents' satisfaction (Bontje et al., 2021). For our study, the GIZ methodology was adapted to address parents' strengths and needs concerning either changing their own behavior and/or helping their children with behavioral change.

The current study aimed to evaluate study participants' experiences and monitor this family-engagement tool's effects on families, in which children are overweight and/or experience psychosocial problems. Unlike most prevalent studies, which have focused on population-level effects, our first objective was to monitor within-family changes in physical activity, eating habits, well-being, and body mass index, as well as their adherence to behavioral change goals and plans. The second research objective was to understand how families changed their health behaviors or well-being and how they set (or failed to set) family goals and plans.

METHOD

Study design

We followed 12 children ages 10–14 years and their parents for 12 weeks using an explanatory mixed-methods design that combined qualitative

research and an n-of-1 study. N-of-1 studies are based on repeated observations within individuals or units (in this case, families) over time and are viewed as an important research method for generating scientific evidence about individuals' health or behavior, particularly when care is personalized to the individual (Vieira et al., 2017). The Medical Ethical Committee of Leiden, Den Haag, Delft (P18.192), approved the study design.

Participants

Six different care professionals recruited families to participate in a pilot study in which the professionals integrated the family-engagement tool in their routine work in the village of Katwijk: a nurse practitioner focusing on mental health problems in a general practitioner's office; a youth worker providing tailored sports advice; a behavioral scientist and a child health professional working with families at Child and Family Services; a dietitian; and a remedial teacher from a primary school. In the study design, it was estimated that each care professional would recruit five families. The inclusion criteria: children ages 10–14 and their parents participating in a child care service that focused on improving either healthy food intake, physical activity, or psychosocial well-being. The exclusion criteria: insufficient knowledge of the Dutch language and no informed consent from either parents or children to participate in the study. The care professionals recruited 25 families with children ages 10–14. After an initial phone call from the researchers to explain the study, 13 families agreed to participate. Of these, 12 started keeping journals three times a week, with both children and their parents encouraged to make journal entries. Eight families completed the journal with 20 or more data points. Three triads (father, mother, and child) and five dyads (mother and child) completed the journal study. Common reasons for dropping out included lack of time, mothers' ongoing difficulties motivating the child and/or spouse to make journal entries, and family's feelings like the questions in the journal did not apply to the family situation. The children in the families that dropped out were somewhat older than the average age (Table 1).

Table 1. Mean score (standard deviation) on health behaviours and quality of life at baseline and follow-up

	Children			Mothers		
	Dropout (n=5)	**Baseline (n=8)**	**Follow-up (n=8)**	**Dropout (n=5)**	**Baseline (n=8)**	**Follow-up (n=8)**
Mean age, years (SD)	11.60 (1.34)	10.50 (0.93)		41.75 (5.44)	41.71 (4.42)	
Mean Body Mass Index, kg/m^2 (SD)	21.35 (4.27)	21.48 (5.07)	21.55 (5.10)	28.31 (9.98)	30.13 (5.55)	30.44 (5.29)
Mean vegetable intake (SD)[a]	4.80 (0.84)	5.25 (0.89)	4.88 (0.99)	4.40 (0.55)	5.43 (0.79)	4.63 (0.52)
Mean exercise days (SD) [b]	5.40 (1.14)	2.75 (2.12)	3.63 (1.69)	3.60 (1.82)	3.57 (1.27)	2.63 (1.51)
Mean Kidscreen-27 total [c] (SD)	106.00 (16.22)	112.29 (7.89)	109.38 (10.45)	n.a.	n.a.	n.a.

[a] Intake per week: 1: Never, 2: Fewer than one time per week, 3: 1–2 days per week, 4: 3–4 days per week, 5: 5–6 days per week, 6: Every day.

[b] Days per week: child >60 min exercise, parent >30 min exercise.

[c] Possible range Kidscreen-27 scores: 0-135

CI – Confidence Interval, SD – Standard Deviation, n.a. – not applicable

Family-engagement tool

The family-engagement tool is based on the *Gezamenlijk Inschatten Zorgbehoefte* (GIZ) methodology, (i.e., joint assessment of care needs), which is an integrated methodology for making shared assessments of care needs and decision-making. The GIZ methodology uses two visual, age-specific tools to structure the consultation: the Common Assessment Framework triangle (CAF) and the Healthy Development Matrix (HDM) (Figures 1a and 1b). To be able to tailor the tool to different target groups, different visuals were developed, e.g., age-specific visuals (parents of babies, schoolchildren, and adolescents), visuals tailored to low literacy, and visuals translated into six different languages (Bontje et al., 2021). GIZ practitioners are trained through manuals, training sessions, and a support course. The GIZ methodology often is used to assess parents and/or children's needs and strengths. In this study, based on six meetings with professionals, GIZ was adapted to assess the needs and strengths of and set goals and plans for both parent(s) and child, thereby engaging the family. The family-engagement tool uses the same two visual, age-specific tools to structure GIZ consultations: the aforementioned CAF and HDM (Figures 1a and 1b). The method comprises three phases (introduction, analysis, and shared decision-making). During the introduction phase, the professional explains the conversation's purpose and structure, creating a common language and framework using the visual tools (CAF and HDM). Throughout the analytical phase, the professional, child, and parents discuss the family's needs and strengths in three domains: the child's development; parenting; and family and social circumstances. When care needs are identified, the professional uses the HDM tool to assess the impact and severity of care needs together with the child and parent(s). This is followed by shared goal-setting and decision-making: The child, parent(s), and professional discuss and decide which follow-up actions are necessary to secure the best outcomes for the family. In collaboration with the family, the professional develops a results-focused action and support plan that is monitored and evaluated using HDM in subsequent consultations. In our study, the professionals focused on improving dietary intake, physical activity, and psychosocial well-being in children and adolescents. They used the

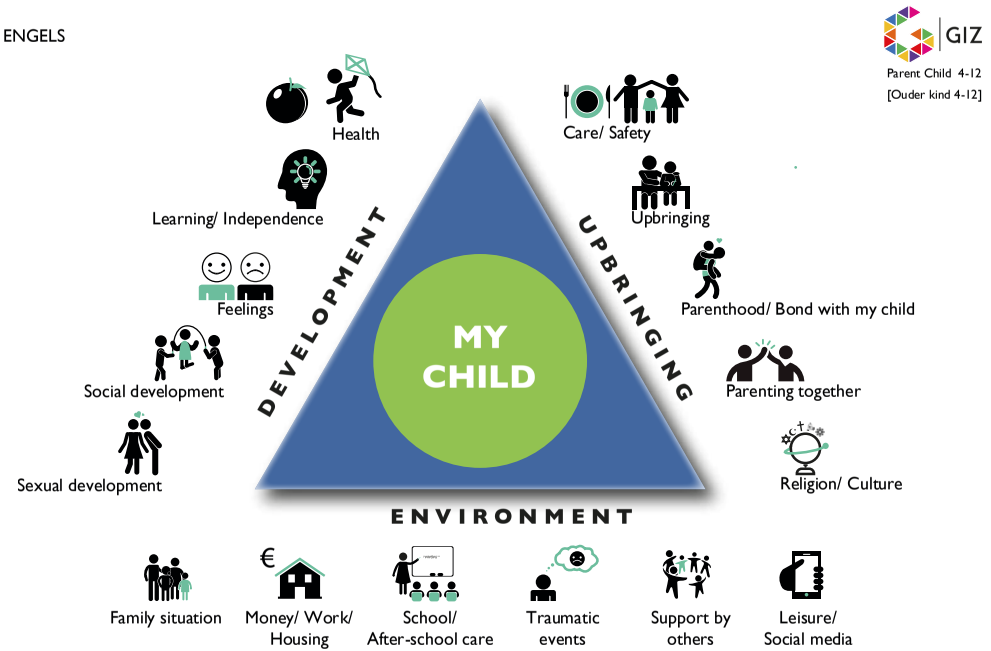

Figure 1a. the Common Assessment Framework-triangle

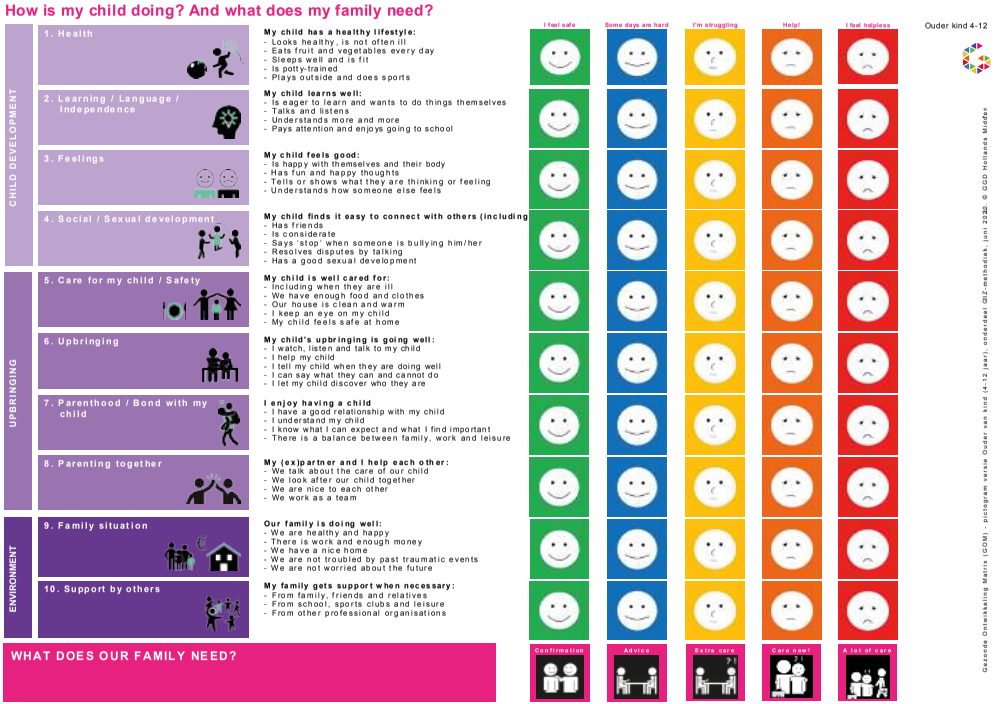

Figure 1b. The Healthy Development Matrix

family-engagement tool in their regular intake procedure and were trained in using the tool with parents and children.

Quantitative data collection

At baseline, families filled out the pencil-and-paper questionnaire in the presence of the researcher(s) during the initial home visit. Over a period of 12 weeks, the journals were sent on a fixed schedule thrice weekly (two weekdays and one weekend day) digitally. If both parents participated, a link to the journal was sent to the father and mother's email addresses separately. Parents and children started filling out these journals online at least three weeks before their first visit with a health care professional in which the family-engagement tool was used. After 12 weeks, the families completed a follow-up pencil-and-paper questionnaire during the final home visit by the researcher(s). Weight and height were measured at baseline and at follow-up. During recruitment, after reading and discussing the information letters for parents and children, participants (older than 12) gave their written consent to have their data collected and analyzed.

For the baseline and follow-up, the questionnaire comprised questions in the following categories: sociodemographic characteristics (age, gender, ethnicity, education level, and employment); eating habits (daily intake of vegetables, fruit, sweets, and soda); physical activity (days per week being physically active for 30 minutes (parent[s])/60 minutes [child]); free time (daily screen time, outside play time); tobacco and alcohol use; physical well-being; and quality of life. For the health behaviors, we used the HBSC study questionnaire (Inchley et al., 2005; Vereecken et al., 2009). The children's quality of life and psychosomatic well-being were assessed using KIDSCREEN-27, a validated questionnaire that assesses children's quality of life based on the following categories: physical health; feelings; mood; self-reflection; spare time; family; friends; school; and money (Ravens-Sieberer et al., 2007). A high KIDSCREEN-27 total score indicates a better quality of life. To assess the parents' quality of life, the EQ-5D-3L was used (Zende, 2007); this tool assesses parents' mobility, self-care, activity, pain, and mood on a scale

of 1 (no difficulties) to 3 (many difficulties) for each aspect. The follow-up questionnaire comprised the same questions as the baseline questionnaire, and once again, participating members were weighed and measured. In the present study, we included questions regarding overweight, physical activity, eating behaviors, and well-being.

The journal questionnaires asked the children and parent(s) to assess their mental well-being during the previous 24 hours concerning hours of sleep, energy level, stress, pain level, and sadness on a scale of 1–10. For the sleep and energy items, a higher score represented better sleep and more energy. For the items pain, sadness, and stress, a higher score represented higher pain level, more sadness, and more stress. The journal also asked participants about vegetable intake and minutes of daily exercise. Daily vegetable intake was scored using the following scale: 1, no vegetables; 2, one serving; 3, two servings; and 4, three or more servings. Physical exercise was measured in minutes. Next, the journal asked about behavioral goals discussed with the health professionals, e.g., how easy or difficult it was to work on and achieve goals, using a scale of 0–10. The questions about goals were asked only after the visit with the care professionals.

The professionals completed a brief questionnaire after using the family-engagement tool. The questions concerned how difficult or easy it was to discuss strengths and care needs with the families (scale of 0–10), setting goals and action plans (yes/no), and referrals for children and/or parent(s) (yes/no). They were given space to elaborate on their answers. Considering that the questionnaire was anonymized with respect to the families, we could not link each professional's experiences with individual families.

Qualitative data

To understand the everyday dynamics of health behavioral change in these families, qualitative data were collected throughout the entire study period. For the journal part, the children and parents were invited to elaborate qualitatively on their day (thrice a week), as they were asked, "Was this in

any way a special day? For example: You were ill; it is your sibling's birthday; it is a snowy day; something nice happened; something sad happened." During home visits, at the beginning and end of the study, the second and sixth author interviewed children and parents about their upcoming or past visit with the health care professional. The face-to-face interviews were conducted in Dutch using a semi-structured interview schedule that assessed the families' experiences with the care professional, using the family engagement tool, and working on the family's health behavior goals. After participants gave their consent, the interviews were audio-taped and transcribed verbatim. Each interview lasted between 30 and 50 minutes.

Furthermore, we took notes from short phone and email conversations with parents, as secondary data sources, throughout the study period. For triangulation purposes, we also included anonymized evaluation forms from health care professionals in the analysis. These evaluation forms, which were filled out after each intake with the family engagement tool, assessed whether professionals set goals and made action plans.

Because obesity and psycho-social problems were "sensitive" topics in the village of Katwijk, often leading to socially desirable answers or early drop-out in existing studies, we integrated arts-based data collection techniques (Bagnoli, 2009). Such techniques have been used in research with children and other groups that are "hard to reach," particularly when little research knowledge exists about the issue at stake (Liamputtong, 2020).

For the face-to-face interviews at the end of the study, we built our topic guide around a descriptive vignette, using arts-based techniques. For example, to assess experiences visiting a care provider and making a family plan, we described a vignette of 10-year-old Ben and his parent, who were recently invited to see a health care professional. The vignette was tailored for each health care professional (an invitation to see a community pediatric nurse, youth worker, etc.). After reading the vignette out loud, study participants were asked to choose from three emojis or pictograms (from a sheet)

to indicate how Ben and his parent would feel before and after seeing the care professional. Participants then were encouraged to elaborate on their choices, first from the perspective of the child and parent in the vignette ("Could you explain why Ben/mother/father would feel this way?"), then from their own experiences

("How was your experience?"). The remainder of the topic guide included questions about priorities in making a family plan and working on health behavioral goals, which also were assessed using the vignette description and sheets with visual tools. The aforementioned interviews were recorded and transcribed verbatim.

Analyses

Descriptive statistics were used to describe the results from the baseline and follow-up questionnaires. We then conducted the analyses, following the steps for an n = 1 study (McDonald et al., 2020). Some data points from the n = 1 study were missing a large majority of the answers; these 23 data points were excluded, leaving 250 data points remaining (39 pre- and 211 post-study). Variables with fewer than 5% missing values after this exclusion were imputed. Day-specific pattern data were imputed manually. For each missing value, it was assessed on which weekday this value was missing, then the average of the previous two values on this weekday and the next value on this weekday was calculated and used as the missing value.

First, we performed multi-level time-series analyses across all children and mothers to assess whether physical activity, vegetable intake, and well-being outcomes changed over time and whether outcomes changed in the period before and after consultation with the family-engagement tool. Second, we employed regression analyses with autocorrelation correction to examine changes within individual children and their mothers and fathers (when they completed the journal). Analyses were performed using SPSS (Version 25).

The qualitative journal data were analyzed using qualitative and thematic content analytic approaches (Mayring, 2004). Then, to understand dynamics in health behavioral change within and across the individual families, the research team jointly reviewed and analyzed transcripts and secondary data, and linked these to the quantitative results. NVivo 11 was used to conduct these analyses.

RESULTS

In 20 weeks, five professionals used the family engagement tool 25 times with children ages 10–14, and 13 families entered the pilot study, with eight used in the main study ultimately. In what follows, we first report on the families' characteristics and their experiences with the family-engagement tool, goal-setting, and action planning. Next, we describe results on health behaviors and well-being across all families, followed by the trajectories of individual families.

Altogether, eight children and their parent(s) completed the study. More dyads (mother and child) than triads (mother, father, and child) entered and completed the study, with a total of three triads finishing the study. Six children visited a health professional for weight-related concerns, with five invited for a follow-up for a preventive health care check with the community pediatric nurse and one visiting the youth worker for tailored physical exercise. In each of these six families, there was an intergenerational pattern of overweight. The mothers' BMI varied between 29.25 and 39.67, and the BMI of the three fathers between 23.55 and 31.02.

Two children visited a health professional because of psychosocial problems. At baseline, these children had a healthy weight, as did their mothers (average BMIs of 23.62 and 24.04, respectively). When comparing the baseline with follow-up data at 12 weeks across the eight families, there were no

important changes in BMI, health behaviors, quality of life, or parental concerns (Table 1).

Experiences with the family-engagement tool

The families in the study indicated that visiting a child health professional can be stressful, eliciting statements such as "You are not quite sure what will happen," "I don't want to be the only one in my class going there," and "I am afraid that my child will be sad because of what is discussed." The reasons to visit the professional despite initial fears were discussed retrospectively, with advantages cited, such as "hearing that my child develops well, also has strong sides," "finding solutions" and "the professional is quite nice." When asked what professionals should know to be able to set goals and action plans, all the families described the importance of being aware of the emotions of children/parents, peer relations, and parenting and contextual factors (such as income). Two families did not remember using the family-engagement tool during their visit with the child health professional. In one family, the child remembered using the tool, but her mother did not.

The professionals who used the tool found it easy to discuss the child and parent strengths (mean = 8.1 [standard deviation = 0.8]), and also reported that it was relatively easy to discuss concerns regarding the child and family (mean=7.5 [SD = 1.0]).

As for setting goals and creating action plans during the consultation, three of the children indicated that they did not set any goals. The other five set goals right after the consultation or a few weeks after the consultation. Seven of the eight mothers reported setting goals at the same timepoint as the child. The post-intervention interviews revealed that in many cases, there was no clear or specific goal setting or action planning during the visit with the care professional. This finding was reported particularly by the overweight children and their families. Rather than discuss goals, these families were advised to continue with the activities that the child and parents already had initiated. The professionals reported that in 29% of the consultations in

which they used the family-engagement tool, no goals were set. In 65% of the consultations, professionals did not develop an action plan with the child and parents. Reasons for not setting goals were that the child and family already had started changing health behaviors, the child was doing well, or there were so many (other) concerns that weight was not the most important concern on which to focus. One family reported that it was easy to set goals, as the goal was to continue what the family already started. In another family with concerns about the child's psychosocial development, the professional reported that during the consultation using the family-engagement tool, the family, particularly the adolescent, displayed anger and resistance to change; therefore, no goals were set at that time. With another family, the parent was reluctant to discuss the child's overweight status with the child present. However, they set goals and made a plan.

Journal effects on health behaviors and well-being across and within families

The children's physical activity mean minutes increased significantly during the period after their consultation with the health professional, compared with the period before the consultation (Table 2). Their vegetable intake did not differ significantly compared with behavior before the consultation with the family-engagement tool, nor did their hours of sleep or levels of pain, energy, or happiness. The mothers did not change their physical activity or vegetable intake levels significantly, but they felt more energetic during the period after the consultation with the family-assessment tool (Table 2).

A closer examination of the individual cases indicated that in five families, the children increased their physical activity after their consultation with a health professional. In three of these five families, physical activity increased significantly (Table 3). By relating these quantitative data to the qualitative data, we tried to understand the families' change trajectories in health behavior and well-being. To contextualize families' trajectories in the study, we used fictitious names for the children and integrated anonymized qualitative data from the journals and interviews.

Table 2: Multi-level time-series analyses of the combined effects on wellbeing and health behavior of children and mothers

	Children n=8			Mothers n=8		
	Timepoints = 39 Mean (SD)	**Timepoint =211 Mean (SD)**	**Effects β (95% CI)#**	**Timepoints =39 Mean (SD)**	**Timepoints =211 Mean (SD)**	**Effects β (95% CI)#**
Sleep, hours						
Family-engagement$	7.96 (1.62)	8.5 (1.87)	0.40 (-0.22, 1.03)	6.84 (2.13)	7.87 (1.65)	0.66 (-0.04, 1.35)
Time			-0.01 (-0.04, 0.02)			-0.01 (-0.11, 0.09)
Energy level, 0-10						
Family-engagement$	7.61 (1.48)	8.03 (2.26)	0.44 (-0.36, 1.25)	7.19 (1.59)	7.85 (1.26)	0.67 (0.12, 1.22)*
Time			-0.01 (-0.04, 0.02)			-0.02 (-0.36, 0.32)
Stress level, 0-10	n.a.	n.a.	n.a.			
Family-engagement$				2.08 (2.36)	1.71 (2.30)	-0.70 (-1.45, 0.05)
Time						0.02 (-0,04, 0.07)
Sadness level, 0-10 Family-engagement$	0.67 (0.85)	0.77 (1.25)	0.10 (-0.41, 0.60)	0.97 (1.93)	1.15 (2.08)	-0.28 (-0.91, 0.36)
Time			-0.01 (-0.04, 0.02)			0.00 (-0.02, 0.02)
Pain level						
Family-engagement$	1.45 (2.40)	1.14 (1.69)	-0.59 (-1.29, 0.11)	0.64 (1.03)	0.68 (1.23)	-0.06 (-0.51, 0.41)
Time			-0.00 (-0.05, 0.04)			-0.01 (-0.03, 0.02)
Physical active, min						
Family-engagement$	64.5 (48.13)	110.44 (59.39)	26.83 (5.31, 48.36)*	56.79 (62.27)	87.24 (65.97)	17.98 (-3043818.80, 3043854.77)[a]

Table 2: Multi-level time-series analyses of the combined effects on wellbeing and health behavior of children and mothers (continued)

	Children n=8			Mothers n=8		
	Timepoints = 39 Mean (SD)	**Timepoint =211 Mean (SD)**	**Effects β (95% CI)[#]**	**Timepoints =39 Mean (SD)**	**Timepoints =211 Mean (SD)**	**Effects β (95% CI)[#]**
Time			0.57 (-0.68, 1.81)			-0.11 (-812.07, 811.86)
Vegetable intake, spoons						
Family-engagement[$]	2.18 (0.97)	2.16 (1.04)	0.06 (-0.32, 0.44)	2.44 (1.10)	2.62 (1.02)	0.04 (-0.36, 0.44)
Time			0.00 (-0.01, 0.01)			-0.00 (-0.03,0.02)

[#] Multi-level model: including family and timepoints as levels, [$]reference group is period before the first consultation with family-engagement tool,

[a] Large differences in reported minutes of physical activities between mothers, * = p<.05,

n.a. – Not applicable, question was not asked, SD – Standard Deviation

Table 3. Regression analyses of the effect of time and pre and post first care professional visit for each of the eight families, separate for child, mother and father (when completed)

		β (95% CI)**						
		Sleep	**Energy**	**Stress**	**Sadness**	**Pain**	**Phsyical activity**	**Vegetable intake**
Family 1								
Child	FET[$]	1.26 (-1.36 to 3.89)	3.17 (1.34 to 5.01)*	n.a.	0.78 (-2.08 to 3.64)	-1.63 (-6.24 to 2.97)	76.62 (22.63 to 130.60)*	0.02 (-2.16 to 2.19)
	Time	0.01 (-1.37 to3.89)	-0.01 (-0.05 to 0.04)		0.03 (-0.02 to 0.09)	-0.01 (-0.10 to 0.08)	-0.62 (-1.67 to 0.43)	-0.01 (-0.04 to 0.02)
Mother	FET[$]	2.89 (1.36 to 4.42)*	0.21 (-1.69 to 2.12)	-1.51 (-3.52 to 0.55)	-2.74 (-4.45 to -1.03)	1.60 (-1.01 to 4.20)	3.05 (-79.44 to 85.53)	1.89 (0.65 to 3.13)*
	Time	0.00 (-0.03 to 0.03)	-0.02 (-0.05 to 0.02)	0.02 (-0.02 to 0.07)	0.02 (-0.02 to 0.05)	-0.04 (-0.08 to 0.01)	0.30 (-1.58 to 2.18)	-0.04 (-0.07 to 0.01)
Father	FET[$]	-0.73 (-2.07 to 0.61)	-1.17 (-2.16 to -0.18)*	-0.90 (-2.01 to 0.20)	0.05 (-0.24 to 0.34)	0.33 (-1.20 to 1.85)	-2.52 (-73.42 to 68.39)	0.98 (-0.06 to 2.02)
	Time	0.01 (-0.03 to 0.03)	0.00 (-0.02 to 0.03)	0.01 (-0.02 to 0.04)	-0.00 (-0.01 to 0.01)	-0.02 (-0.06 to 0.01)	-0.20 (-1.82 to 1.42)	-0.02 (-0.04 to 0.01)
Family 2								
Child	FET[$]	0.67 (-1.83 to 3.17)	-0.31 (-1.94 to 1.31)	n.a.	0.52 (-0.31 to 1.35)	-0.35 (-1.20 to 0.50)	40.23 (-0.41 to 121.49)	0.04 (-1.79 to 1.87)
	Time	-0.09 (-0.29 to 0.11)	0.01 (-0.12 to 0.14)		-0.09 (-0.17 to 0.01)	0.00 (-0.07 to 0.07)	-0.04 (-6.60 to 6.51)	0.02 (-0.13 to 0.17)
Mother	FET[$]	-1.31 (-4.39 to 1.78)	0.39 (1.32 to 2.11)	0.97 (-0.48 to 2.42)	-0.00 (-0.60 to 0.59)	0.00 (-0.07 to 0.08)	50.55 (-17.95 to 119.05)	0.52 (-0.18 to 2.21)
	Time	0.23 (-0.02 to 0.48)	0.11 (-0.04 to 0.26)	-0.16 (-0.27 to 0.04)*	0.00 (-0.05 to 0.05)	-0.07 (-0.21 to 0.08)	-2.44 (-7.96 to 3.08)	-0.06 (-0.20 to 0.08)

Table 3. Regression analyses of the effect of time and pre and post first care professional visit for each of the eight families, separate for child, mother and father (when completed) (continued)

		β (95% CI)**						
		Sleep	**Energy**	**Stress**	**Sadness**	**Pain**	**Phsyical activity**	**Vegetable intake**
Family 3								
Child	FET[$]	-0.73 (-4.35 to 2.89)	-0.15 (-5.41 to 5.11)	n.a.	-1.84 (-3.13 to -0.55)*	1.29 (-1.00 to 3.58)	-25.41 (-119.94 to 69.21)	0.29 (-1.15 to 1.73)
	Time	-0.00 (-0.09 to 0.08)	-0.03 (-0.15 to 0.10)		-0.04 (-0.07 to - 0.01)*	-0.03 (-0.08 to 0.01)	2.21 (-0.03 to 4.46)	0.01 (-0.03 to 0.04)
Mother	FET[$]	0.73 (-3.04 to 4.50)	1.26 (-2.36 to 4.88)	-0.61 (-5.39 to 4.17)	2.37 (-2.87 to 7.60)	0.17 (-2.63 to 2.97)	31.37 (-66.66 to 129.39)	-1.61 (-4.38 to 1.16)
	Time	-0.04 (-0.13 to 0.05)	-0.02 (-0.08 to 0.05)	0.10 (-0.01 to 0.22)	-0.02 (-0.14 to 0.11)	-0.03 (-0.09 to 0.04)	-0.25 (-2.18 to 2.08)	0.05 (-0.00 to 0.10)
Family 4								
Child	FET[$]	0.68 (-0.59 to 1.95)	0.19 (-0.82 to 1.20)	n.a.	0.46 (-1.19 to 2.12)	-0.33 (1.44 to 0.79)	71.09 (25.09 to 117.08)*	-0.66 (-1.58 to 0.26)
	Time	0.03 (0.00 to 0.062)	0.00 (-0.02 to 0.03)		-0.01 (-0.05 to 0.03)	0.03 (0.01 to 0.06)	-0.35 (-1.50 to 0.81)	0.01 (-0.01 to 0.04)
Mother	FET[$]	-0.42 (-1.29 to 0.44)	-0.17 (-0.93 to 0.60)	-0.32 (-2.11 to 1.46)	-0.43 (-1.16 to 0.30)	0.02 (-0.41 to 0.44)	-1.59 (-16.51 to 13.34)	-0.59 (-0.02 to 0.02)
	Time	0.01 (-0.02 to 0.03)	-.01 (-0.03 to 0.01)	-0.03 (-0.07 to 0.02)	-0.01 (-0.03 to 0.01)	0.00 (-0.01 to 0.01)	0.14 (-0.21 to 0.48)	-0.00 (-0.02 to 0.02)
Father	FET[$]	-1.16 (-3.24 to 0.93)	0.00 (-1.27 to 1.28)	-3.07 (-4.66 to -1.49)*	-0.07 (-0.36 to 0.22)	0.92 (-0.36 to 2.20)	-7.59 (-24.04 to 8.86)	-0.26 (-1.17 to 0.66)
	Time	0.03 (-0.03 to 0.08)	0.01 (-0.02 to 0.04)	0.01 (-0.03 to 0.05)	-0.00 (-0.01to 0.00)	-0.03 (-0.06 to 0.00)	-0.01 (-0.42 to 0.41)	0.01 (-0.01 to 0.03)

Table 3. Regression analyses of the effect of time and pre and post first care professional visit for each of the eight families, separate for child, mother and father (when completed) (continued)

		β (95% CI)**						
		Sleep	**Energy**	**Stress**	**Sadness**	**Pain**	**Phsyical activity**	**Vegetable intake**
Family 5								
Child	FET[$]	1.77 (-0.33 to 3.86)	0.39 (-2.73 to 3.51)	n.a.	0.32 (-0.63 to 1.28)	-1.38 (-3.06 to 0.30)	-3.13 (-57.57 to 51.32)	0.15 (-0.40 to 0.70)
	Time	-0.06 (-0.18 to 0.06)	-0.00 (-0.19 to 0.18)		-0.05 (-0.11 to 0.01)	-0.05 (-0.14 to 0.05)	1.61 (-1.56 to 4.77)	-0.78 (-2.65 to 1.09)
Mother	FET[$]	0.52 (-3.71 to 4.76)	0.01 (2.30 to 2.31)	0.05 (-4.65 to 4.75)	-3.30 (-6.22– to 0.39)*	-0.24 (-0.61 to 0.13)	20.66 (-29.21 to 70.52)	0.42 (-1.36 to 2.21)
	Time	-0.27 (-0.52 to 0.03)*	-0.11 (-0.24 to 0.03)	0.08 (-0.19 to 0.36)	0.10 (-0.07 to 0.27)	0.04 (0.02 to 0.06)*	-0.69 (-3.25 to 1.86)	0.01 (-0.10 to 0.11)
Family 6								
Child	FET[$]	-0.30 (-0.85 to 0.26)	1.85 (0.10 to 3.60)*	n.a.	0.75 (-0.46 to 1.96)	-2.90 (-5.50 to -0.30)*	18.38 (-0.43 to 79.88)	-0.92 (-2.49 to 0.66)
	Time	0.01 (-0.01 to 0.03)	0.02 (-0.04 to 0.07)		-0.02 (-0.07 to 0.02)	-0.04 (-0.13 to 0.06)	-0.36 (-2.48 to 1.77)	0.03 (-0.03 to 0.08)
Mother	FET[$]	1.35 (-0.40 to 3.09)	1.73 (0.06 to 3.41)*	-2.15 (-3.93 to -0.36)*	0.15 (-0.19 to 0.49)	-0.14 (-0.55 to 0.28)	28.06 (-18.58 to 74.69)	-0.48 (-1.87 to 0.91)
	Time	0.09 (0.02 to 0.17)	0.00 (-0.06 to 0.06)	0.00 (-0.06 to 0.07)	0.00 (-0.01 to 0.01)	0.01 (-0.00 to 0.03)	0.02 (-1.68 to1.71)	0.00 (-0.04 to 0.04)

Table 3. Regression analyses of the effect of time and pre and post first care professional visit for each of the eight families, separate for child, mother and father (when completed) (continued)

		β (95% CI)**						
		Sleep	**Energy**	**Stress**	**Sadness**	**Pain**	**Phsyical activity**	**Vegetable intake**
Family 7								
Child	FET$	2.01 (0.91 to 3.11)*	0.74 (-1.50 to 2.98)	n.a.	-0.11 (-0.33 to 0.11)	-0.07 (-0.41 to 0.28)	1.49 (-0.31 to 34.56)	0.79 (-0.70 to 2.28)
	Time	-0.06 (-0.09 to -0.03)*	-0.03 (-0.09 to 0.03)		-0.00 (-0.01 to 0.00)	-0.00 (-0.01 to 0.01)	-0.92 (-1.79 to -0.05)*	-0.02 (-0.06 to 0.02)
Mother	FET$	-0.44 (-2.26 to 1.37)	-0.72 (2.44 to 1.00)	0.25 (-0.11 to 0.61)	0.01 (-0.17 to 0.17)	-0.02 (-1.74 to 1.70)	1.91 (-22.83 to 26.66)	-0.46 (-1.83 to 0.91)
	Time	-0.03 (-0.07 to 0.02)	-0.02 (-0.06 to 0.03)	-0.01 (-0.02 to 0.00)	0.00 (-0.00 to 0.01)	0.02 (-0.03 to 0.06)	0.30 (-0.95 to 0.36)	-0.00 (-0.04 to 0.03)
Father	FET$	0.66 (-0.96 to 2.29)	0.37 (-1.08 to 1.81)	0.17 (-1.96 to 2.29)	0.96 (-0.81 to 2.73)	0.68 (-0.71 to 2.07)	-18.67 (-35.28 to -2.05)*	-0.24 (-1.71 to 1.23)
	Time	0.02 (-0.03 to 0.06)	0.02 (-0.02 to 0.05)	-0.07 (-0.12 to 0.01)	-0.04 (-0,09 to 0.00)	-0.02 (-0.05 to 0.02)	0.15 (-0.29 to 0.59)	0.00 (-0.04 to 0.04)
Family 8								
Child	FET$	-0.34 (-1.80 to 1.11)	-1.36 (-3.69 to 0.96)	n.a.	-0.35 (-2.14 to 1.44)	0.32 (-1.64 to 1.01)	-28.75 (-96.19 to 38.69)	-0.34 (-1.44 to 0.75)
	Time	-0.03 (-0.10 to 0.04)	0.41 (-0.08 to 0.16)		0.04 (-0.05 to 0.13)	0.05 (-0.02 to 0.12)	3.47 (0.05 to 6.88)*	0.03 (-0.03 to 0.09)
Mother	FET$	0.56 (-1.41 to 2.52)	1.93 (0.26 to 3.60)*	0.18 (-2.10 to 2.45)	0.13 (-0.32 to 0.59)	-1.78 (-2.95 to -0.62)*	24.69 (-46.98 to 96.35)	0.20 (-0.74 to 1.13)
	Time	-0.00 (-0.10 to 0.10)	-0.08 (-0.16 to 0.01)	-0.08 (-0.19 to 0.04)	0.01 (-0.01 to 0.03)	0.01 (-0.05 to 0.07)	-0.47 (-4.10 to 3.16)	0.01 (-0.04 to 0.05)

FET – Family-Engagement Tool, **Adjusted for autocorrelation, $ reference – time before visit with care professional, * = p <0,05, n.a.– not applicable, question not asked

In Family 1, 12-year-old Grace (fictitious name) and her parents consulted a practice nurse (at the general practitioner's office) because of her anxiety problems. Grace and her mother both reported that they had set goals during the consultation with the practice nurse, who referred them to a psychologist after a few sessions. During the pre-consultation phase, Grace mostly reported feeling sick. She subsequently increased physical activity significantly and felt more self-perceived energy during the period after the consultation with the practice nurse. Post-consultation, she started mentioning activities with peers, which could explain the significant increase in physical activity. Activities included "going to the beach with my friend," "volleyball," and "swimming pool visit with dad." Her mother, who reported an increase in hours of sleep, mentioned visits to the practice nurse and psychologists in her journals, who provided her with tools to cope with her concerns and problems. The father mentioned proactively losing weight during the study (his weight decreased from 95 to 88 kilograms). He also reported feeling less energetic during the period after the consultation, but the cause of this lower energy was not clear.

In another family (Family 4), Carly (age 11) and her mother visited the community pediatric nurse, who invited them for a consultation related to the child being overweight. In the journal study, Carly indicated that she had set a goal that she found quite easy to achieve. Over time, Carly increased her minutes of physical activity significantly. Her BMI decreased slightly after 12 weeks, from 22.32 to 22.16. In the post-consultation journals, she reported participating in social activities, including "a sleepover at my friend" or "I stayed over at grandma's with my family." However, Carly's mother indicated that she had not set a goal, which was consistent with what her father reported in his journal. Carly's mother did not recollect making a plan with the community pediatric nurse: "She always scores higher on the growth curves…." The health professional said that she will have a growth spurt soon; her weight will then decrease on its own." The mother did not change in terms of well-being, physical activity, or vegetable intake. During the interview, she mentioned that working on her health was complicated by

continuous family health issues during the study period, as recorded in the journals. For example, one of her journals said: "It's my birthday, and I have three sick children at home." In one of his journals, Carly's father reported that he was not aware of his child's food intake: "*I often do not know what my child eats and what her goals are because I work irregularly, and two days a week, I am in another city (with an overnight stay) because of training.*"

In Family 8, the family visited the behavioral scientist at Youth Care Services due to concerns over Brian's (age 12) mental health. In this setting, the professional created a plan with the family, with goals for Brian and his parents, which were evaluated on a weekly basis. If the plan proved to be too difficult, the health professional discussed new coping tools and/or adapted the plan. Brian increased the number of minutes of physical activity over time (independent of the consultation). His mother reported experiencing less pain and was more energetic post-consultation.

In Family 2, Walt, an 11-year-old, joined a guided physical activity group, which focused on providing a positive sports experience to overweight children. Besides a general goal to be more physically active, the mother and child reported that they did not set a specific goal with the physical activity coach. Walt increased his minutes of physical activity (although not statistically significantly), as did his mother. On the days when the child visited the physical activity coach, his number of physical activity minutes was higher. His BMI decreased from 20.30 to 19.82.

In Family 6, Stella (age 10) and her mother increased their physical activity, albeit not significantly. Stella increased her physical activity by joining (family) activities, such as going to the beach, swimming pool visits, and participating in a march, which her mother encouraged. In the journals, her mother noted: "She has done so well" and "I am so proud of her going to the pool!" They were both significantly more energetic during the period after the consultation with the health professional. They reported that no goals were set regarding Stella's weight. Her BMI increased slightly after 12 weeks, from 25.00 to 25.72.

During the interview, her mother mentioned that Stella already was physically active, ate healthy, and did not eat or drink large quantities of soft drinks or candy, making it difficult to think of what to change. Upon reflecting on her experiences with the family-engagement tool, Stella's mother spoke about feeling surprised that the health professional was not aware of the details of their family situation, which became evident during the consultation with the family-engagement tool. Her husband, Stella's father, had passed away, leaving behind a family with five young children, which was not noted in the child's file. Stella's mother stated that such information should be taken into account, as this might influence Stella's health, including health behavior, and well-being, as well as the mother's ability to implement change.

Three other children visited a child health professional regarding being overweight, but did not increase their physical activity or vegetable intake. Bella, the child from Family 7, significantly decreased physical activity minutes over time, independent of the consultation, with her BMI increasing from 27.58 to 28.16. Her father also reported fewer minutes of physical activity. During the consultation, the family and the health professional discussed a general goal to change Bella's weight from some concerns (orange zone in the HDM, figure 1b) to no concerns (the green zone). However, Bella's mother also reported that the health professional expected a growth spurt, which was connected to the agreement to "be a little bit more careful" and to continue as they had done before.

In Family 5, Lucy (age 11) visited the child health professional for her weight, which had decreased since the last visit with the health professional. During the interview, Lucy's mother mentioned that because her daughter had lost weight, the goal was to "keep (up) the good work." During the study period, Lucy's BMI decreased, from 25.38 to 24.70. Her father did not participate in the study. Like many other mothers in the study, Lucy's mother linked this to his long working hours: "Once he gets home, he just wants to be at peace." This was one of the few families that remained in the study despite the mother's initial distrust of preventive screening and recollections of previous negative

weight-related interactions with health professionals (as discussed during the interview).

Mabel, the child from Family 3, and her mother were invited to see the child health professional after going through several life events. Mabel's parents recently divorced, and her mother and the children had moved to a (smaller) home on the other side of town, far away from peers and the extended family. Speaking about weight immediately elicited shame and sadness, Mabel agreed to enter the study on the condition that she would not be weighed. Mabel reported a significant decrease in sadness after the consultation with the child health professional, who tailored her consultation to Mabel's fear of being weighed. The mother, child, and health professional did not really discuss a plan regarding the child being overweight, although the professional provided advice about grocery shopping habits, such as refraining from buying sweets and sugary drinks. In light of ongoing stress related to the divorce and major changes in family life, it was jointly decided to focus first on non-weight concerns. They discussed support, such as language and speech guidance and psychosocial support for the parents and child, and decided to focus on reducing the child's weight during a later stage.

DISCUSSION

Overall, after a consultation using the family-engagement tool, the children's physical activity improved. However, the mothers' health behavior during the study changed to a lesser degree, although they were more energetic. These results seem to be in line with extant studies' findings that family engagement and decision-making can enhance the impact of interventions that aim to improve children's health (Chase-Lansdale & Brooks-Gunn, 2014). However, in focusing on the individual families, we found that effects differed considerably between them. Some families seem to have altered their behavior and demonstrated changes in their well-being, explaining overall effects, while others did not. The data indicated that the family-engagement

tool often was used without setting specific or family goals. Whenever goals were set, families reported more changes. Below, we discuss our findings in light of studies that have examined barriers to instigating (health) behavioral change, particularly goal setting, within families.

Our findings seem to indicate that setting specific goals and action plans can help elicit engagement in activities and (health) behavioral change in some children and parents (Enright et al., 2020). While consultations for child mental health problems led families to set goals and engage in more (everyday) activities, consultations focusing on children's overweight often did not stimulate this engagement process. The differences in goal setting and behavioral change might have been related to common perceptions of overweight in this community. In line with previous studies in Katwijk and elsewhere, mothers commonly stated that their children's weight was not related to their health behaviors, with obesity perceived as something that children "outgrow" in adolescence (E. Kelleher et al., 2017; Slagboom et al., 2020; Ziser et al., 2021). The difference in engagement and goal setting between families also might reflect different drivers for visiting a health care professional. Parents generally instigated consultations related to mental health problems, while consultations related to overweight resulted from an invitation from the community pediatric nurse after a routine preventive health visit at school. Taken together, our findings confirm that differences in explanatory models for overweight and the absence of intrinsic motivation function as important barriers to health behavior change among youths and their parents (Zhang et al., 2020) (Dwyer et al., 2017).

The family-engagement tool was developed to identify strengths and needs in children's development, parenting, and the family's social context (Bontje et al., 2021). Consequently, goals and plans depend on identification of these concerns. Our study confirms that when urgent child, parenting, or contextual issues emerge, these are likely to be prioritized over goals in the physical health domain (Mann et al., 2013). In at least one of the families in this study, contextual concerns led to limited action related to the child's overweight.

Our findings also are in line with those of studies that have demonstrated the complexity of truly integrating a two-generation approach in health care and community settings, with an emphasis on the prevention of overweight (van der Kleij et al., 2016). Setting goals with multiple family members undeniably means touching upon parents' childrearing practices or their own food or physical activity habits, which can be sensitive issues for the professional to address. To be able to use the family engagement tool as intended (Kung & Scholer, 2021), more research is needed to examine which skills are needed to navigate such complexities entailing multiple and interrelated care needs and goals.

In four families, the fathers did not participate in the study despite being actively involved in their children's lives, confirming that fathers tend to be more difficult to recruit for research and interventions (Allport et al., 2018; Phares et al., 2005; Vollmer et al., 2019). In this study, non-involvement often was linked to fathers working long hours and/or working abroad for extended times, a common pattern for men in this former fishing village (Slagboom et al., 2020). The two families in this study that displayed positive changes in their physical activity or well-being had fathers who were involved actively in filling out the journals. While our study cannot assess whether paternal involvement caused behavioral change in these children, the data suggest some kind of relationship between fathers' involvement and their children's health behavior. As demonstrated in other studies, most fathers in our study did not attend the care professional consultation with their wives and children, i.e., other strategies are needed to involve fathers (Allport et al., 2018).

One strength of this study is that it examined health behavior changes in both children and parents, as well as the dynamics within the family. Another strength of our mixed-methods evaluation is that it allowed for examining health behavior change processes in everyday life in a way that included both parents and children's perspectives. However, this study contained several important limitations that could have impacted the results' reliability sig-

nificantly, the most important of which was sample size. Only eight families provided sufficient data for the journals, resulting in a lower power to detect an effect of the family-engagement tool. The use of repeated measurements to account for the limited number of participating families meant however that there were far more data points than families, thereby increasing the power. However, it should be noted that we had far more post-study data points than pre-study data points. To understand the value of the differences between pre- and post-family engagement consultation, we integrated a qualitative approach, allowing us to shed light on "the story" behind these figures within families. Another limitation was the missing values, which we had to adjust for using manual calculation and imputation. Manual imputation allows room for human error from miscalculations. We maintain that in this setting, manual imputation would provide the most accurate values, as we accounted for weekly patterns and within-family differences.

Furthermore, response bias is a well-known phenomenon in self-reported data (Rosenman et al., 2011). Response bias can be a result of a lack of understanding, social desirability, or simply mistaken recollection of events. This limitation is present in all studies concerning ecological momentary assessments using self-reports. Given the large confidence intervals across mothers, it is likely that in our study, the question on the number of minutes of physical activity per day was subject to different interpretations. However, this differential understanding elicited less of an effect on time-series analyses of the individual families. Future research should combine self-reported data with more objective data, e.g., data retrieved through physical-activity-tracking devices or apps.

Considering that the study did not include a control group, it remains unknown whether differences in health behavior and psychosomatic well-being were due to the use of the family-engagement tool specifically or to the visits to the health care professionals in general. The journals on their own also can be viewed as an intervention, which could influence the results. As demonstrated in previous studies, families that entered and completed

the entire journal study probably were somewhat different from those that did not enter or did not complete the study. We observed that families who spoke about a clustering of social and health concerns during the home visit and voiced distrust toward care services and/or brought up competing explanatory models for overweight during the initial phone call often did not enter the study or withdrew after a few days. The families included in this study were most likely those that felt more capable/able to discuss health behavior change and adhere to goals and plans. Despite this well-known bias, which is difficult to account for, we were able to follow, in a family-focused setting, how mothers juggled health behavioral changes in everyday life.

Finally, while the child care professionals were trained in the use of the family-engagement tool, and families generally were accepting of a broad assessment of strengths and needs, as well as a family-focused approach to behavioral change, it remains largely unknown whether the tool was used as intended. During the follow-up interviews, mothers or children occasionally did not recognize the family-engagement tool, and several families could not recall setting specific goals to improve health behavior. More implementation research is needed to map how the family-engagement tool is used to approach health behavioral change in a variety of child care services, particularly in working with families that report (urgent) concerns in various life domains.

To sum up, this study found that a family-engagement tool can exert positive effects on some families' health and well-being, particularly among those who feel capable of discussing their concerns and needs. However, it also demonstrated how difficult it is to engage families in health behavior change in the face of care needs in other life domains. Therefore, family-engagement approaches could focus more on how to develop and integrate attainable goals and plans for multifaceted health problems, as in the case of childhood obesity, e.g., by combining goals and strategies in different life domains and for different family members. In identifying the intricacies of family-focused health promotion, child care professionals' education needs to incorporate

skills training for goal setting and action planning in the face of complex and multifaceted health problems.

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ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Leiden Medical Ethical Committee Leiden Den Haag Delft. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

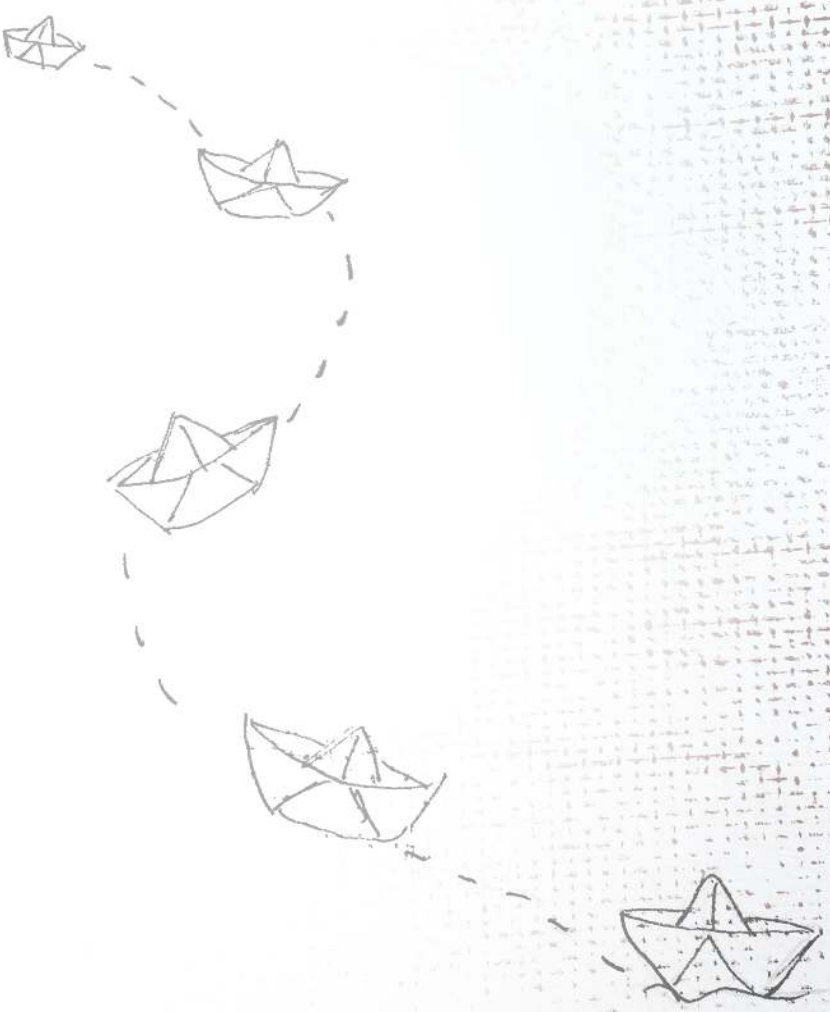
AUTHOR CONTRIBUTIONS

MC and MNS conceptualized and designed the study, collected data, carried out the analyses, drafted the initial manuscript, and revised the manuscript. AO collected the data, carried out the initial analyses, and revised the manuscript. NW, LS, and MCES collected the data and revised the manuscript.

RR conceptualized and designed the study and revised the manuscript. All authors contributed to the article and approved the submitted version.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.



Chapter 5

Just one more cookie: An ethnographic study of subversion in weight-related health promotion in a Dutch fishing community.

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ABSTRACT

Background Weight-related health promotion can be heavily contested. This qualitative study attends to protesting responses in WRHP in the context of Katwijk, a former fishing town in the Netherlands.

Methods Building on interviews with families and health professionals, and four years of participant observation in family-focused health promotion activities for children and their parents, this study examines commonplace expressions of subversion and analyzes why WRHP is protested against in this particular context. The interviews and notes were analyzed for themes and patterns using qualitative content analyses. Further, leveraging an arts-informed approach, cases of protesting responses in WRHP are scripted into theatre dialogues, which were analyzed for social dynamics and conflicts.

Findings Joking, anger, mocking, and polite responses were identified as commonplace expressions of subversion. Against the background of historical and contemporary unequal power relations between the public and government in Katwijk, subversive responses are likely underpinned by a protest against institutional indifference toward adverse social circumstances and a protest against the power of health institutes as a result of the perceived threat to social cohesion and continuity.

Conclusion This study demonstrates that strained socio-historical relations between the general population and government institutes need to be considered when introducing public health interventions in historically deprived communities. A contextualized analysis of subversive responses in health promotion can shed new light on behaviors often framed as non-compliance, resistance, and avoidance. Such an analysis might provide the information necessary to sensitize and tailor communication strategies in public health programs targeting childhood obesity.

INTRODUCTION

Dad, can I have a cookie?'.
'No, darling, you just had your breakfast'.
'But Daddy… just one, one very small cookie?'
'No, Suzy, you know the rules. No snacks after breakfast.'
'But Dad, Daddy, I am still hungry. Please! Daddy! Pretty please?

On a Tuesday evening, common childrearing dilemmas such as this filled the stage of the community center. A handful of parents had gathered to watch the interactive educational play *'Voor je het weet zijn ze groot'* ('They grow up before you know it'), a public health initiative targeting childhood obesity in Katwijk, a former fishing town on the west coast of the Netherlands. Just as little Suzy is about to continue nagging for another cookie, the actors stop the scene: "*What could dad do, in this situation?*" Silence. Murmuring. Mothers joking among each other. Until Clive (pseudonym), a father, shouts from the back of the room, "For goodness' sake, *just give that child another cookie!*"

Despite efforts to reduce obesity among youth worldwide, there is no sign that its prevalence is declining (Ahrens et al., 2014; 2021; World Health Organization, 2019). Even when interventions for childhood obesity are available, these are not always taken up by families (Anderson et al., 2019; Hoeeg et al., 2020; Kelleher et al., 2017; Mead et al., 2017; Teevale et al., 2015; van der Kleij, 2017). Rather, as shown in Clive's response to the cookie scene above, weight-related health promotion (WRHP) is often contested/protested. A powerful case of protest against WRHP was found in Katwijk, where obesity is highly prevalent across generations. A powerful case of protest against WRHP was found in Katwijk, where obesity (BMI >25) is highly prevalent across generations. In 2020, the prevalence of obesity was 50% among adults aged 18 to 64 years and 18% among 2- to 14-year-olds. Among youth, obesity is particularly highly prevalent among 10- to 11-year-olds and 12- to 14-year-olds, reported as 25% and 21%, respectively (Community Health Service Hollands Midden, 2020). Due to concerns over rising obesity rates among

2- to 14-year-olds (14% in 2012, 18% in 2020), the municipality of Katwijk invested in an intersectoral community program called JOGG (*Jongeren op Gezond Gewicht*, or Young People at a Healthy Weight), targeting childhood obesity. Contrary to expectations, the program's preventive activities were not well attended. To improve the uptake of preventive interventions, it is essential to find out *why* particular groups hold off or contest interventions (Heggenhougen & Clements, 1990). The current study builds on the notion of 'subversion' to examine commonplace protests against WRHP from a sociohistorical perspective.

Several explanations have been suggested for the phenomenon of the low uptake of WRHP, despite ample availability. First, the uptake of WRHP can be compromised by the fear of stigma (Noordam & Halberstadt, 2016; Palad et al., 2019). Second, lifestyle recommendations may not be compatible with families' needs (Kelleher et al., 2017; Palad et al., 2019; Skelton & Beech, 2011; Teevale et al., 2015) and sociocultural contexts (Hoeeg et al., 2020). One relatively unexplored explanation for the low uptake of WRHP is resistance to governmental and, by extension, health institutes. Resistance fueled by mistrust of public institutions (Peeters et al., 2020) has been widely documented in communities with a history of adverse social conditions, including poverty and political exclusion (Perry, 2021). In the recent COVID-19 pandemic, for example, scholars showed that vaccine hesitancy among African American communities (Bogart et al., 2021) and Latin American farmworkers (Gehlbach et al., 2021) in the US was fueled by legacies of mistreatment by institutes. Similarly, a study among a historically disadvantaged Bedouin community described how a cycle of distrust affected the uptake of interventions targeting *brucellosis*, an endemic infectious zoonotic disease known as a 'disease of the poor' (Hermesh et al., 2020). Another study among mothers in Puerto Rico during the Zika epidemic linked widespread resistance to Zika-related public health messaging to women's collective memories of coerced sterilization and clinical trials in the colonial past (Horan, 2020). Stories of these painful experiences were passed down from mother to daughter, leading to continued deep institutional mistrust.

Protest against health promotion

To the author's best knowledge, only a single study has focused on resistance as an explanation for the low uptake of WRHP. In the Netherlands, sociologist Van Meurs and colleagues (2022) observed a trend of 'negative' online comments to health promotion-related news posts. In the former study, for example, one person commented, "*Everyone should decide what to eat him- or herself. [People in] government jobs should be dealing with other things*! (2022, p.4)". The authors' preliminary analysis of these online comments showed that health-promotion messages were seen as unsolicited attempts by outsiders to interfere with freedom of choice (2022: p.4). A follow-up survey study showed that institutional distrust and anti-paternalism, two aspects of anti-institutionalism, largely explained the lower uptake of nutritional information among less educated individuals. Lifestyle recommendations were likely to be associated with the elite, their untrustworthy institutes, and their sense of moral superiority. Coupled with feelings of misrecognition, aversion against these dominant elitist institutes inspired resistance toward nutrition advice (van Meurs et al., 2022).

To date, explanations of resistance to WRHP programs have largely focused on individual rather than community processes. Current scholarship lacks a framework in which local history, including historical power relations, is central to the analysis of everyday resistance against health promotion. For example, Van Meurs' study provides invaluable insights into anti-institutionalism among less educated individuals but does not address the extent to which historical power relations between the general population and institutes steer anti-institutionalism. In light of the local sociohistorical context, historical power relations are important to address, as they can act as catalysts to resistance (Scott, 1985). Dahl defined power as: "*A has power over B to the extent that he can get B to do something that B would otherwise not do* (1957, p.202)". The latter aspect has been extensively discussed in the medical anthropologist literature but is scarcely researched on a day-to-day basis at the microlevel of interactions in health care.

Subversion in weight-related health promotion: How and why?

Recently, population-wide responses in the COVID-19 pandemic have underscored the need to refine analytical tools to understand the low uptake of public health interventions in specific populations (Zixuan et al., 2021). Therefore, this study adds subversion as an analytic tool to conceptually capture resistance to WRHP in communities with a history of endemic social conditions. The Latin root for subversion*, subvertere,* means 'to turn from below'/'to overthrow' and refers to the process of opposing or undermining power (Vocabulary, 2022). In his publication *Weapons of the Weak*, anthropologist James Scott (1985) was one of the first to study how people exercise their agency when open acts of resistance might be dangerous, for example, in interactions with landowners, employers, or government. He was especially interested in everyday forms of resistance "that do not make headlines" (Scott, 1985, p.XVII). He argued that people who might be seen as relatively powerless have hidden ways of critiquing and resisting the powers that be, challenging that *A* can *always* get *B* to do something that *B* otherwise would not. Commonplace and relatively subtle ways of overthrowing power are gossip, rumors, jokes and "foot dragging, false compliance, feigned ignorance, arson, sabotage slander" (Scott, 1985, p. 29). By studying these everyday and somewhat hidden ways of undermining power within their sociohistorical context, Scott attended to larger issues that give rise to resistance (Scott, 1985, p. 29).

Following up on Scott's work, Barnes and Prior (2009) attended to the ways in which professionals and citizens undermine government intentions in the policy context. In the volume 'Subversive Citizens,' Barnes shows three commonplace strategies of subverting government intentions: revision, resistance, and refusal. Although distrust toward government has been widely documented in communities with a history of power inequality, including fishermen communities in the Global North (Jentoft, 2007; Zundel, 2019), to date, little is known about subversion in health care. The first research ques-

tion in this article, therefore, is 'What are the commonplace expressions of subversion in WRHP in Katwijk'?

Further, the analysis of such expressions is extended with a psychological anthropological approach. Similar to Barnes and Prior and Scott, subversive responses are not approached from a moral position, whereby subversion is considered good, bad, or even heroic. Rather, the study sets out to understand how and why people, individually and collectively, protest against WRHP in this context. For a contextualized analysis of institutional distrust and anti-paternalism, I recur to the work of medical anthropologist Arthur Kleinman and colleagues (Kleinman et al., 1997, p.ix), who studied health phenomena in communities with a shared history of 'social suffering'. Social suffering refers to human problems that result from "what institutional, political and economic power does to people, and reciprocally, how these forms of power themselves influence responses to social problems" (Kleinman et al., 1997, p.ix). Through their work, ranging from rural China to metropolitan New York, Kleinman and his colleagues showed that the local community functions as the foundation of social life, and that daily life deeply matters (Kleinman et al., 1997; Yang et al., 2007). Therefore, Kleinman and his colleagues urged the study of population-wide responses to health care by asking what people, individually and collectively—as deeply engaged stake-holders—stand to lose, to gain, and to preserve when engaging in health care interventions. For example, studies of low uptake of mental health interventions showed that engagement with these interventions, each heavily stigmatized, threatened the accumulation of financial resources among Chinese-American migrants (Yang et al., 2014) and family prestige among families in urban India (Slagboom, Bröer, et al., 2021). In this article, Kleinman's approach is extended to protesting responses in weight-related interactions, leading to the second research question: From a local perspective, whom and what is protested against when weight health promotion is contested?

RESEARCH CONTEXT

In the 17th century, the small town of Katwijk had one of the largest fishing fleets of the Netherlands. The town was ruled by vessel owners and other wealthy, highly educated people who held powerful positions in the church (Deursen, 2011; Society Old Katwijk, 1974). The life of fishermen was uncertain, and often harsh. A family's income depended on the catch, working conditions on the ship were poor, and the fishing occupation came with dangers such as drowning (Deursen, 2011; Leydse Courant, 1867). Historically, the maritime community of Katwijk was known for its close-knit families and Orthodox Protestant Christianity (Deursen, 2011). Families were strongly organized in a positional way (Bernstein, 2003), meaning that roles and responsibilities were allocated by position: older, younger, male, or female. Grandparents carried a lot of weight. There were women's and men's jobs. Men, who worked offshore for weeks or months, were the breadwinners and head of the family. Women took care of the (large) family and were in charge while the men were away (Beelen & Hing, 2009; Deursen, 2011).

Public health reports (1840–1940) show that fishermen families in Katwijk were vulnerable to poor health outcomes. Figures for adverse health outcomes were often strikingly higher than elsewhere in the region. School physicians worried about children's low vaccination rates, tuberculosis, malnourishment, poor oral health, and poor eyesight (NTVG, 1934). Infectious diseases, such as typhoid, tuberculosis, and cholera, were endemic in the town, causing high mortality rates (Geneeskundige Courant, 1849; Municipality Katwijk, 1981). During the cholera epidemic in 1849, Büchner, a physician, described how living circumstances in the fishermen quarter—poverty, proximity to fish waste, large families in small houses, and no means to quarantine—heightened the risk for infection, and death (Geneeskundige Courant, 1849). During such epidemics, preventive measures known to mitigate the risk of adverse health outcomes were only available to wealthy families (Geneeskundige Courant, 1849).

For many fishermen families, life continued to be harsh throughout the 20th century. During World War I (1914 –1918), 26 ships from the Katwijk fleet were blown up by mines, leading to the drowning of 103 men (Deursen, 2011). Given that families worked together on one ship, such accidents often led to the loss of three generations of men (Deursen, 2011; Society Old Katwijk, 1974). According to Van Deursen (2011), during World War II, a large part of the fleet was confiscated, and many men were sent to work in Germany. To build a defense wall along the coastline, 600 houses were demolished, leading to the forced migration of women and children to other parts of the country. In 1945, after returning to the town after the war, the fishing fleet had lost many ships, and there was a severe housing shortage.

In the early 20th century, the fishing fleet consisted of 130 ships (Museum of Katwijk, 2022). Due to fishing bans, fishing quotas, and globalization, from the 1970s onwards, the fishing industry declined rapidly, turning Katwijk into a fishermen town without ships (Reformatorisch Dagblad, 1971). Vessel owners sold their fishing rights for a large sum. For fishermen families, the deterioration of the fishing industry has led to mass unemployment and a rapid change in livelihood (Beelen & Hing, 2009; Deursen, 2011). Over the years, the community had multiple disputes with local and national governments over building a local port, fishing bans, and fishing quotas (Reformatorisch Dagblad, 1976). The current fishing fleet consists of 10 ships. Recently, Dutch fishermen have been in conflict with the European Union over a ban on using electric pulse fishing (NOS, 2021), giving rise to the sense of being robbed of the North Sea (Verschoor, 2022).

Although fishing is no longer the main occupation of families in Katwijk, many aspects of daily life remain unchanged. Men continue to work long hours and largely remain providers and heads of family. Women are increasingly entering the formal labor market, but the greater emphasis is on their responsibility of running the household.

METHODS

This study was embedded in a four-year applied study "Levensloopaanpak", an interdisciplinary, mixed methods focusing on understanding and addressing population wide patterns of intergenerational poor health.

The town of Katwijk (43000 inhabitants) was selected as a study area because of a pattern of poor health outcomes across generations (Slagboom et al., 2020; Slagboom, Reis, et al., 2021). Fieldwork for the Levensloopaanpak study was conducted in a neighborhood with some of the poorest health outcomes in Katwijk (13510 inhabitants).

Between 2015 and 2019, a methodology of focused ethnography (Knoblauch, 2005) was combined with multigenerational life course interviews, and participatory action research (PAR) with children, families and professionals (Minkler, 2005). For the multigenerational life course study, the author conducted oral history interviews with seven key informants, and interviewed children, parents, and (when possible) grandparents from 16 families (Slagboom et al., 2020). In addition, she observed interactions occurred during activities that children and families regularly visited, such as schools, churches, community centers, care facilities, and local events. The interview topics, recruitment, and sampling for the interview study are detailed in Appendix 1._

Following the above-mentioned multigenerational life course study, researchers, families, and professionals from the social, medical, and policy domains worked together in four PAR projects (Appendix 1). Each of the PAR projects aimed to organize health promotion activities to improve the physical activity, healthy nutrition, and wellbeing of children aged 10-14 years and their families in the study area (Crone et al., 2021). A list of health promotion activities that resulted from the PAR projects, as well as information on who and what was targeted with the activities, is provided in Appendix 2. Over the course of 3.5 years, the author and her research team observed

interactions and conducted (informal) interviews during the preparation, implementation, and evaluation of these health promotion activities.

The PAR projects were co-designed with families (from the study area) and health professionals working in the study area (both from the locality and from outside the locality). Health professionals included community social workers, nurse practitioners focusing on mental health problems in a general practitioner's office, youth workers providing tailored sports advice, behavioral scientists and child health professionals working with families at Child and Family Service, dietitians, and remedial teachers from schools.

In every first interaction, in newsletters and in interviews in the local paper, the author made herself known as a researcher interested in health and wellbeing of families. In informal interviews, the author repeated her research interest and regularly asked permission to take notes. In a community that often distrusts professionals from governmental institutes, including research institutes, the author's longitudinal, everyday engagement laid a foundation for trust, which enabled her to connect with children, (grand) parents, and professionals. Acceptance and sensitization of the author were further facilitated by her professional experience as drama therapist in working with families, and her personal experiences of growing up as a chubby child in a Dutch Orthodox Protestant community.

With a special interest in protesting responses in WRHP, interviews and notes were analyzed for themes and patterns, following the four steps outlined below.

1) Open coding of weight-related interactions
2) Thematic coding of tense weight-related interactions
3) Comparison of expressions of protesting responses in WRHP
4) Comparison of themes and patterns across cases of protesting responses in WRHP

Following the above four steps, building on an arts-informed research approach (Cole & Knowles, 2008) in health research (Rosenbaum et al., 2005; Rossiter et al., 2008), cases of protesting responses in WRHP were scripted into theatre dialogues. The abovementioned theatre dialogues were then analyzed for social dynamics and dramatic conflicts by coding the theatre dialogues for roles, role reversals, emotions, and expressions. NVivo 11 was used as a tool for analysis.

Over the course of four years, interviews, observations of interactions, and theatre dialogues were discussed in bi-weekly reflective meetings with the two supervisors of the Levensloopaanpak study. In addition, as part of the participatory action research cycle, observations of interactions were regularly discussed with stakeholders, such as mothers and professionals involved in health promotion.

To protect the identity of the participants, identifying information was omitted from transcripts, pseudonyms were used, and occasionally, the characteristics of participants were altered or combined to maximize anonymization. Research permissions were granted by the Medical Ethical Committee of Leiden University Medical Centre, which gave the studies a statement of no objection.

FINDINGS

In a sports hall, local stakeholders gathered for a presentation of the research project "Levensloopaanpak". During the presentation, the research team expressed their interest in family health, and how health outcomes in families might be shaped by the town's historical context. Following the presentation, a community leader was the first to rise from his chair for a question. Looking around the room, he immediately brought up the issue of weight by saying:

> *I think…that you are merely interested in the fatties of Katwijk. (…) I have the strong suspicion that one of you just wants to write an essay or so about this.*

This micro scene was the first of many times that 'weight' and 'power' were immediately readily brought together in a conversation about health, followed by a cynical joking response that ended with a strong sentiment of 'keep out'. In fact, virtually every subsequent interaction with the research team of the '…' study contained clues of the strained relationship between community members and powerful institutes. The following paragraph first outlines three common responses in weight-related interactions. 'Weight-related interactions' refer to interactions in which food traditions or body posture were addressed explicitly, but also to more subtle, everyday actions that can be associated with health promotion goals. Next, the paper describes subversion against the sociohistorical background of Katwijk in order to understand whom and what is protested against when health promotion is contested.

COMMONPLACE EXPRESSIONS OF SUBVERSION

Anger and agitation

Health promotion professionals regularly spoke about their struggles in engaging families in activities, such as water drinking or fruit eating campaigns. Such activities were met with angry, agitated responses that reflected negative sentiments. For example, when the municipality tried to introduce a 'healthy foods policy' in the local soccer club cafeteria, this was immediately met with protest by mothers. An article in the local paper that quoted two mothers read:

> *It is condescending. Do you really think children will spend their buck on a healthy sandwich? Just leave them alone.*

In another example, a 72-year-old grandmother angrily objected to a water drinking campaign at a school. During a conversation with a teacher, she took a candy bar out of her bag, summoned her six-year grandchild over, and asked her to unwrap and eat the bar, saying, "*I get to decide what she eats.*" Through this agitated response, the grandmother indirectly critiqued institutional interference in their everyday lives; her response implied that 'nobody tells me how to raise my grandchild'. Similarly, a mother protested against school breakfast, a JOGG health promotion activity that she described as 'forced upon children'. Like many others, she said, "*School is school, home is home.*" When her children asked for 'new' types of breakfast foods, she taught her children that school habits would not apply in her home. She said:

> *All of a sudden, my kids wanted to eat things like cottage cheese and so on. I don't think so, I told them, you will eat bread with chocolate sprinkles, as we always do.*

Objection toward health promotion also came in the shape of a protest against state power. For example, a father commonly voiced 'negative comments' on local health promotion social media accounts. When he was invited to talk about his comments, he said, *"You are trying to control the population; you don't realize how much power you have."*

Joking and mocking

As illustrated in the Dad-and-Cookies scene in the introduction of this article, joking and mocking were other commonplace ways of pointing back at institutes and protesting paternalism. Such responses were particularly observed in everyday interactions that contained clues about WRHP goals. Someone choosing water over a fizzy drink, arriving at a meeting by bike instead of car, passing the sugar for coffee, or declining an offer for a cookie: such everyday actions were immediately met with a mocking *"Trying to be healthy, are we?"*

Over the years, I have found that the protest response occurred not only in weight-related interactions with families but also often in conversations with local care professionals. For example, I unpacked carrots as an afternoon snack, a local health professional, laughed out loud, poked her neighbor, and called out for her colleagues to come and see: *"Look! Carrots. Oh my, if you join her project, you will become a rabbit too!"*

Polite-yes-but-no responses

Less explicit, but no less common, were the subversive yet polite 'yes-but-no' responses in WRHP. In such instances, families would seemingly respond positively to invitations to health promotion, or health promotion advice. However, as evidenced by a generally high no-show rate, an initial positive agreement often did not result in action. Tom, a dietician for children, reported that up to 25 percent missed consultations daily. Fearing that families would not come back at all, he did not dare to charge for these no-shows. Health promotion professionals often spoke about suddenly not being able to reach parents anymore. One professional, for example, said:

> *Often, I can't reach them afterwards, not by phone or by mail. People don't pick up the phone, or hang up once they realize it's me.*

In direct interactions with health promotion professionals or researchers, families respond enthusiastically to invitations to health promotion or health promotion advice. Once the professionals were out of sight, the advice or suggested program would be mocked. As an illustration, a mother, Lily, accepted an extra invitation from the school nurse to discuss her son's overweight. During the overweight consultation hour, she nodded agreeingly to the nurse's suggestions and politely took leaflets of the prevention program. When asked about her child's food intake, Lily cited the 'golden rules' of health promotion, such as giving her children a maximum of two treats per day and water instead of sugary drinks. She added that her children only ate

sweets on special occasions and that she sent them to play outside every day. Prior to the visit, however, she told the interviewer:

> *He is a big, sturdy boy, and that's what he has always been. You know, he is just a spitting image of his father, who is a sturdy, big man. That is what he is going to be too (…) I might as well go (to the obesity screening, red.), but I don't feel like making a great effort. If the nurse says he should lose a few kilos, well… I don't think so. I won't adhere to that.*

WHOM AND WHAT IS PROTESTED AGAINST?

Weight-related messages were associated with unwarranted institutional interference—in other words, "meddling from above," which triggered a protesting response. This finding resonates with observations from an earlier study indicating that anti-institutionalism is likely to drive widespread resistance against public health messaging (van Meurs et al., 2022). In this section of the article, which attends to the second research question, the commonplace expressions of subversion in WRHP are studied in light of the sociohistorical context of Katwijk. Following Kleinman, I analyzed *whom and what* is protested against, and what people stand to gain or lose when engaging in health promotion. To this end, the following paragraph describes the legacies and current contemporary experiences with institutes that are likely to underpin subversive responses.

Protest against institutional indifference toward local concerns

Historically, mistrust among fishermen in the Netherlands was related to limited support from the 'elite' in the face of harsh working and living conditions, and the deterioration of the fishing industry. In low-income neighborhoods in Katwijk, poor social conditions are not merely stories from the past. Ten percent of the population continues to live in poverty (Odekerken et al., 2021). Cumulative stress related to poor housing, poor

working conditions, and financial stress continues to drive vulnerability to poor health (Anonymous, 2020). Health promotion programs, then, seemed to trigger a protest against institutional indifference to pressing matters. This critique resonated in a conversation with Dave, a 33-year-old father, who mockingly expressed his doubts about our research program conducted in his neighborhood:

> *Madam researcher, you might as well stop what you are doing [research on health across generations in Katwijk, red.]. I can tell you the outcome right now. The aches and the burnouts. It is the pressure for a good house, a nice car, a beautiful woman. Making ends meet, unemployment, money… those worries. Stress is the biggest thing here.*

Dave described the relationship between adverse socioeconomic circumstances and poor health, and protested against what Popay and colleagues (2010) described as "lifestyle drift", the tendency of institutes to focus on individual lifestyle factors rather than taking action to address structural factors. Worries over income or housing often hampered efforts to implement health promotion activities, such as cooking or sports classes. Tina, for example, could not focus on the sports activity that she had signed up for in the community center. She was one of many mothers who worried about having to leave her old apartment block, which would soon be replaced by new apartments, which she would not be able to afford. On this particular morning, she could not focus because she had been up half the night due to the noise caused by her drug-addicted neighbors. Scared by the yelling and screaming sounds from next door, her children could not get to sleep. A month prior, there had been a fire in the apartment, one of the many incidents in the poorly maintained apartment block. In short, conversations with Dave, Tina, and others testified of people who feel that the government does little or not enough in the face of their everyday worries and challenges.

Protecting the family against the power of health institutes

Institutional distrust was also triggered in interactions with health care professionals and medical researchers, who were readily associated with the state. A deep mistrust manifested strongly during the recruitment of the elderly from the town for three-generation life course interviews. As soon as the first author disclosed that she worked at the academic hospital on the border of Katwijk, these elderly, mostly fishermen's families, politely declined to be interviewed.

Interlocutors from younger generations explained their (grand)parents' general mistrust of health institutes as a heritage from the past, a time in which fishermen families belonged to the poor low class's and doctors to the powerful elite. For example, 60-year-old Steve described that for his mother's generation, who grew up poor, visiting a doctor continues to be an extremely frightening situation. After Steve introduced me to his 80-year-old mother, she explained that her fear of doctors started in her early childhood when she lost her mother. Like many other poor families, she was raised with the thought of avoiding doctors as "*one only pays the doctor for him to tell you that you will die, so why would you*?" This fear continued throughout her adult life as a fishermen's wife. At the age of 19, she lost her husband to pneumonia, leaving her without an income and pushing her young family into extreme poverty. Being pregnant a few years later during her second marriage to a fisherman, Gertrude feared for her life when her labor started on a Sunday evening. As Sunday was a church day—the Sabbath—she did not dare to ask for help. Out of fear of the repercussions of breaking church rules and wanting to protect herself and her baby, she struggled through the night by herself. Seventy-five years later, the pain and fear she experienced that night continued to haunt her in nightmares.

Although grandparents like Gertrude often kept silent about their painful past experiences, lessons about protecting oneself from powerful institutes seemed to be passed on to subsequent generations through their storytelling. In life history interviews, stories of the elderly were often filled with

funny (family) anecdotes of pranking powerful figures and Houdini-like escapes during fearful situations. For example, May, a grandmother who looked back on a harsh life from her early childhood onwards, laughingly told stories about dodging social workers and youth services to protect herself and her family.

Despite the growing availability of health care, the lesson of distrusting health care seemed to be passed on from one generation to the other. For example, 50-year-old Sarah avoided consulting a doctor for her mother, who had become forgetful and increasingly experienced problems with judgment and planning. Instead of consulting a medical professional, the family preferred to solve everyday concerns among themselves, which she explained by saying, *"In our family, we generally distrust health care."*

Slowly closing her palms together, Sarah illustrated her families' mechanism of silently dealing with their worries: *"If we don't talk about it, it isn't there."*

The lessons about protecting oneself from powerful institutes seemed to have extended across three generations, as manifested in interactions with parents of school-aged children. For example, during the recruitment phase of a survey study of parents and their school-aged children, mothers commonly feared the negative consequences of participating.

> *What will happen to us if our answers are communicated to other health or governmental institutions?*

The immediate institutional mistrust was particularly instigated by questions on everyday food choices. As an illustration, during a fieldwork visit, a mother took the author aside behind closed doors, lowered her voice, and explained that her survey questions were risky. The survey contained a question on parents' and children's' daily uptake of vegetables. To decide whether she and her family would participate, she asked, *"Who will be reading these answers?"*

Another mother feared that her answers to the abovementioned survey would endanger the social benefits related to her husband's illness. Lowering her voice, she explained that she could not serve her family vegetables on a daily basis: *"Nienke, I know I should. I really do. We all do. Sometimes, it's just too expensive."*

A few years later, on one of the author's last days of fieldwork, two mothers confided that they, like many mothers in the neighborhood, had been hesitant to participate in the survey study. As the questionnaire contained questions about weight, food intake and encouraging exercise, the mothers had feared the repercussion of child services, who had the authority to take the children from their homes: *"It would not be the first time, you know."*

PRESERVING THE FAMILY UNIT: FEEDING PRACTICES, FOOD RITUALS, AND CHILDREARING DUTIES

Four years of ethnographic work enabled the examination of weight-related interactions through a kaleidoscopic lens (Siddique, 2012)— new and different insights constantly materialize from familiar scenes and interactions. During home, school, and church visits, and in the corridors, while gradually building trust, the author chatted with countless mothers, children, and their families. From these conversations, an insider's perspective on protecting the family against the power of health institutes emerged. WRHP measures triggered a sense of interference of institutes within the private sphere, particularly interference with family feeding practices and social relations. Therefore, these measures also triggered immediate protests *within* the community and *within* families. The following paragraph describes how protesting *against* health promotion, which implicitly encouraged changes in family feeding practices, family roles, and childrearing duties, meant choosing *to* preserve the family unit.

Respondents often spoke about food rituals, feeding practices, and eating patterns that are characteristic of Katwijk. Historically, there has been a strong tradition of sharing evening meals with the wider family, a food ritual passed on from one generation to another. For example, families meet at Grandma's for Sunday Coffee after church. Other food rituals include daily coffees, Saturday Fries, and the traditional Fish Friday. Throughout the years of fieldwork, many (grand)children spoke warmly of the cakes, cookies, and treats for which their grandmas were renowned. A preference for these food groups was described as a hallmark of belonging to the population of Katwijk: "*We have a sweet tooth.*" In a focus group, one family described the piles of goodies that were typically served at Grandma's Sunday Coffee after church:

Marly:	*After church, we begin with coffee …*
Stella:	*With something yummy*
Marly:	*Apple pie, cake or butter cake. When that is over, then there is cheese and sausages*
Stella:	*And chips!*
Marly:	*Then there are the chips, heaps and heaps of chips. Well, then, if it's summer, they [the children, red.] also get an extra ice cream*
Stella:	*And when they go home, a nice marshmallow …*
Marly:	*A candybar….*
Interviewer:	*This is still at Grandpa's and Grandma's?*
Marly:	*Yes Grandpa's and Grandma's. You have to understand; this is how it has always been.*

Anthropologists have emphasized that people form their eating patterns in relation to others. Mothers explained that at these recurring family gatherings—contrary to health promotion advice of portion control—being able to eat a large amount of food was highly valued. Families explained the appreciation of the ability to eat a lot (load up) as a legacy from a time in which fishermen's life was physically strenuous and food was often scarce. Joining

in the abovementioned food rituals and feeding practices affirmed belonging to the group. By contrast, declining foods offered resulted in immediate protest. One mother, for example, explained how turning down Grandma's treats was perceived as a grave insult. Passing on a piece of butter cake during Sunday Coffee would attract comments such as, "*Have you gone mad?"* from her grandmother and the rest of the family. Deviating from recurrent feeding practices and changing the course of food rituals seemed to be discouraged through public mockery and joking. Mothers' efforts to implement health behavioral change—replacing chips with nuts or tomatoes, restricting the portions of snacks, or sticking to the plan of eating greens—put them at risk of being labeled disloyal. Occasionally, mothers spoke about being caught between conflicting norms of being a good mother. Monica, for example, spoke about the difficulties she experienced when she implemented behavioral changes as advised:

> *By now, I have a bad reputation; they will say: "Oh, not her again," "For goodness sake, get off the child's back."*

WRHP messages were not only protested against because of perceived interference with food rituals that hold families together but also because of perceived intrusion with childrearing, a domain of the family rather than the state. At a fundamental level, WRHP messages carried clues of 'untrustworthy' institutes interfering with social relations.

As illustrated earlier in this article, when parents or grandparents protested against WRHP, their agitated, mocking, joking, and polite responses often implied that "nobody tells me how to raise my child". These protests against (health) institutional interference in everyday life reflected critical public health studies arguing that health promotion messages are inherently paternalistic, as they promote certain ways of eating that people otherwise would not choose and mingle with decisions that are deemed deeply social. In the literature, health promotion measures represent nannying by the state (Calman, 2009; Steele et al., 2021) or "broccoli paternalism" (S Jongers,

2022). While this critique of paternalism is well documented, a protest against health institutional interference in the private sphere took particular shape in Katwijk. In this historically Orthodox Protestant community with more or less fixed family roles and child-rearing duties, institutional interference clashed with the biblical duties of grandparents and parents to raise and educate children as they see fit. Warnings against paternalism by the state, for example, were conveyed in the Gezinsgids, a well-known monthly magazine for Orthodox Protestant families. Observing the growing influence of the government on family life, one article addresses how to deal with the state trying to 'get behind the front door' (Roelof, 2016). In another article, a political leader from an Orthodox Protestant Party stated:

> *We must be weary of anything that reeks state pedagogy. […] First and foremost, the upbringing lays in the hands of the parents. It is their biblical duty.*

In articles and sermons on Sunday, the message conveyed that how children navigate the world needs to be 'fed from behind the front door' (Roelof, 2016: p.16). To live by God's ground rules, families need to work hard to fulfil their childrearing duties and make radical choices against the governmental tendency to strive for individual freedom and thereby mingle with fixed family roles. For example, after linking institutional distrust to institutional failures, a scholar in education emphasized the importance of preserving religious values—values that represent an inherently different worldview than those imposed by the government. In an interview in Gezinsgids, he said, "*State pedagogics form a threat […] The best way to deal with threats is to resist them* (Leeuw, 2021, p.52)."

Although many families no longer lived by the 'strict' rules of Orthodox Christianity, it seemed that family members continued to line up in protest when child rearing duties were threatened. In a society where group conformity, social cohesion, and continuity are held in high esteem, measures steering toward individualism and self-determination were immedi-

ately protested against. As illustrated above, a mechanism to protect and preserve the family unit was not only triggered in interaction with state representatives—the outsiders—the protests extended to insiders trying to implement health promotion measures in the family environment, most notably mothers. The strong mechanism of protecting and preserving social cohesion and continuity occasionally brought about a fatalistic sentiment among mothers and local care professionals alike that 'nothing can be done'. These intended change agents struggled with the gridlock that immediately emerged when they followed, or provided, health promotion advice. Mary, a local health professional, well familiar with the sweet battles within families, wondered whether health promotion could ever work in the context of Katwijk. She said:

> *You can't win this one. As much as I believe change is needed, it is just too strong.*

Similarly, another mother described how she often felt stuck in her family:

> *It is really difficult for parents. Because you have to grow up in a family. They are what you've got—the family—or it won't work. But together, you won't get anywhere.*

In the introduction of this article, Clive made a comment that opposed the suggestions of weight-related health promotion. He overthrew the suggestion to give up his role as indulger and restrict his child from having another cookie. Jokingly, he protested against meddling by external institutions and emphasized his right to raise his child as he saw fit. In this instance, mothers in the audience immediately recognized the gridlock triggered whenever health promotional measures implied changing traditions or family roles. One mother said, "*This, this is exactly what always happens*." Another mother shouted, "*Clive, that's how it will never change*."

DISCUSSION

This study examined commonplace protests against WRHP in Katwijk, a former fishing town on the West Coast of the Netherlands. The findings indicate that joking, mocking, anger, agitation, and politeness are likely underpinned by a protest against institutional indifference to local worries and the desire to protect the family unit against the power of health institutions.

Through a close investigation of everyday interactions, this study provides insights into the stakes in an area that has been demonstrated to be controversial: childhood adiposity. Overall, the findings of this study add to the literature describing the complexities that health professionals face when addressing children's overweight (Alegria Drury & Louis, 2002; Mikhailovich & Morrison, 2007; Puhl & Brownell, 2003; Schalkwijk et al., 2016). As the majority of studies of tense interactions in weight-related care focus on individual processes, with this paper, I highlight the need to examine population-wide interaction patterns, as these can reveal what people, individually and collectively, stand to lose when engaging in obesity care or health promotion.

In a review of complexities in obesity interventions, Skelton argued that it is often a mystery to clinicians why 'simple, high-impact behavioral change can be difficult to implement' (2012, p. 892). Findings from this study confirm that because weight is associated state health control ambitions, health promotion can trigger historical institutional distrust (van Meurs et al., 2022) as well as system and surveillance critique (Bunton et al., 2003), thereby providing explanations for why health promotion measures and messages are contested. While the abovementioned studies often focused on battles with the state—outsiders—this study also draws attention to battles that are set off within the family. This study addresses the idea that WRHP measures can also be heavily contested because of a perceived threat to social structure. In the context of the family, health promotion measures seemed to threaten prevailing feeding practices and food rituals, as well as fixed

family roles and child-rearing duties. Thus, at a fundamental level, a worldview represented in health promotion interventions—valuing individualism and self-determination—clashed with the worldview of a society that holds social cohesion, continuity, and group conformity at its core. In everyday life, therefore, a choice *for* behavioral change, as promoted by health promotion professionals, could become a choice *against* the social structure. In line with studies that have emphasized food and eating as a social practice (Delormier et al., 2009; Visser, 2016), I therefore, point to the limitations of behavioral change models that focus on individual behavior theories in addressing a phenomenon that is deeply social: food intake.

The observation that social and economic problems hindered families' capabilities to eat differently, or to be more physically active, resonates with other critiques of tackling obesity through measures focused on individual behavioral change (Popay et al., 2010; Rutter et al., 2017). A recent Cochrane review concluded that despite current understandings of the complex etiology of obesity, interventions persist to be skewed toward downstream, individualistic determinants (Nobles et al., 2021). The protesting responses in this study, one might say, confirmed the influence of the food environment on overweight (Osei-Assibey et al., 2012) and called attention to the struggles of child rearing in an obesogenic environment. Therefore, the joking, anger, mocking, and polite responses in WRHP might also be translated as a form of system critique, as a way of pointing back at broader, upstream factors that shape food intake and physical activity.

A weariness of health promotion measures and messaging is not unique to Katwijk. The protective mechanisms triggered by a perceived threat to the social structure might go a long way in explaining the low uptake of preventive public health measures in communities with similar social characteristics. In the Netherlands, for example, measures meant to contain COVID-19 were met with angry and mocking responses in Orthodox Protestant communities, groups that reported higher infection and mortality rates at the height of the pandemic (Engels, 2020; Oskam et al., 2021). Rather than

implying that protest against preventive public health measures are related to the sociodemographic characteristics of Orthodox Protestant religion, a recent study indicates that the findings of this study are likely a reflection of communities of close-knit families with a strained relationship with the government (Zixuan et al., 2021).

This study was not without limitations. First, because studies examining subversion in weight-related care for children are scarce, limiting the comparability of outcomes, the exploratory nature of this study needs to be emphasized. Second, this study was carried out after observing a recurring pattern of tense interactions in WRHP, which means that the data collection for the specific research questions was not planned in advance. Rather, the author relied on the triangulation of qualitative data collected throughout a four-year participative action research project aimed at improving interventions. Relatedly, the data used in this study included observations from interactions in thePAR studies, which the author coordinated for over three years. The multi-positionality of the author might have biased the analysis. Although combining research roles and working data from applied studies has its limitations (Vernooij, 2017), it is doubtful whether insights into the phenomenon under investigation would have been fully understood if the author had not been involved in tailoring health promotion activities. Being present in a wide range of weight-related interactions allowed for an in-depth, thoroughly contextualized exploration of protesting responses that are otherwise hard to grasp.

Future qualitative studies seeking to understand the low uptake of interventions are recommended to triangulate traditional methods such as interviews, which predominantly measure stakeholders' perceptions, with methods that attend to interactions in clinical encounters and everyday life. If families sufficiently trust a researcher to record their encounters with care professionals and their families, future studies could integrate conversation or discourse analysis into their design. Following the identification of common themes in a qualitative study, a survey study might be used to

validate these themes in populations with similar sociodemographic characteristics. To address feelings of disloyalty that may arise when participants are directly asked to reflect on family or community processes, arts-based and arts-informed methods with components of projective techniques are recommended. The observation that fathers resisted the changes that mothers tried to introduce underscores the need for more research into the role of paternal support and gender in obesity research and interventions. While public involvement was at the core of the health promotion interventions observed for this study, fathers were not sufficiently represented. The findings of this study underscore that *everybody* who has a seat at the table needs to be included in future applied studies focused on strengthening health of families.

This study confirmed the importance of knowing a community's history and legacies with health institutes. This is not only true for health professionals working with families but also for researchers who intend to design and deliver health interventions using public involvement. Due to researchers' affiliation with universities or health institutes, their work can also be associated with state interference, which can trigger immediate distrust. Budgeting extended time for community building is therefore recommended. The findings from this study also highlighted the relevance of training health professionals and researchers to be sensitive to the many faces of fear and protection, which might include anger, joking, mocking, and polite nodding. In addition, the knowledge, attitude, and skills required to attend to children's food intake (what's literally on their plate) as well as families' living circumstances (what's figuratively on their plate) need to be integrated into the curriculum for professionals working in health promotion for children.

CONCLUSION

This contextualized analysis of subversive responses in health promotion sheds new light on behaviors often framed as low adherence, noncompli-

ance, and avoidance. In communities with strained sociohistorical relations between the general population and government institutes, lessons of protection passed down the generations need to be considered when introducing public health interventions. Such an analysis can provide the necessary information to sensitize and tailor public health programs targeting childhood obesity.

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DECLARATION OF INTEREST

None.

SUPPLEMENTARY FILES

Appendix 1: The design of the multigenerational life course interviews and PAR projects

In the first phase of the multigenerational life course interviews, the author collected oral histories to map the town's history and to explore how contextual changes have affected family life since the 1940s. As described in the Methods section (Slagboom et al., 2020, p:3), these data were gathered through (informal) conversations with elderly key informants (>65 years) during participant observation sessions in a community center. Then, data sources (local books, newspaper articles, and popular religious magazines) were analyzed to gather information on local concerns about family life, childrearing, health, and wellbeing. In the second phase, children, parents, and (when possible) grandparents participated in semi-structured, life-course interviews. "After drawing a timeline to describe life events and medical history, the participants were asked to elaborate on the times and circumstances in which these events took place. After the participants read the information letter and signed an informed consent form, the interviews were audiotaped and later transcribed verbatim. In addition, professionals from inside and outside the locality who regularly interacted with youth and their parents (e.g., social workers, nurses, youth workers, teachers, religious leaders) were interviewed about their experiences working with families in Katwijk.

This interview study used two recruitment strategies through announcements in local newspapers, social media, and flyers: one focusing on the youngest generation and one on the eldest. Inclusion criteria for families to be eligible to participate in the interviews were: 1) at least one generation had grown up in the designated neighborhood; 2) at least one of the clustering diseases "ran in the family"; and 3) two or more generations were available and willing to be interviewed" (Slagboom et al., 2020, p:3). Families were purposefully sampled, and inclusion criteria for families to be eligible to participate in the interviews were: 1) at least one generation had grown

up in the designated neighborhood; 2) at least one of the clustering diseases (psychological distress, cardiometabolic conditions, or pain) "ran in the family"; and 3) two or more generations were available and willing to be interviewed" (Slagboom et al., 2020, p:3).

Following the multigenerational life course study, families and professionals from the social, medical, and policy domains worked together in four PAR projects. The author and her research team observed interactions during all phases of these projects: preparation, implementation, and evaluation. In the first PAR project, representatives of primary and secondary schools, child, and youth services, community-based social work, and the municipality formed a network to facilitate and organize family-focused health promotion in the study area. Between 2016-2019, the network met on a regular basis (every three months).

In the second PAR project, volunteers from a community center (mostly grandmothers and mothers) and professionals (community social workers, youth workers) selected and jointly organized family-focused health promotion activities for children aged 10–14 and their parents (Appendix 2). These activities aimed to improve physical activity, healthy nutrition, and wellbeing. The author and her research team observed interactions during the preparation, implementation, and evaluation of these health promotion activities.

For the third PAR project, families in the study area worked together with a community social worker, a community artist, and a photographer in creating and distributing an arts-based health promotion campaign. The campaign aimed to increase awareness of the intergenerational transmission of health and wellbeing in families. Following a family interview by the community artist, the photographer took family portraits depicting habits or life lessons passed on across generations. Each month, one family portrait was exhibited throughout the town. For another activity of the campaign, school-aged children, supported by a community artist, wrote and distributed poems on

habits and life lessons in their family. A selection of these poems was also printed in the local newspaper, and made available as free postcards.

Lastly, in the fourth PAR project (Crone et al., 2021), health promotion professionals integrated a family-focused approach into their everyday work. To this end, the professionals integrated an intergenerational approach into a frequently used shared assessment tool for children's care needs (Bontje et al., 2021). As described elsewhere (Crone et al., 2021, p:3), seven professionals participated in the abovementioned PAR project: "a nurse practitioner focusing on mental health problems in a general practitioner's office; a youth worker providing tailored sports advice; a behavioral scientist and a child health professional working with families at Child and Family Services; a dietitian; and two remedial teachers from a primary school. Before and after the pilot study, the author and her team interviewed the professionals on the barriers and facilitators to using a family-focused approach in their health promotion work.

During the pilot study, 14 children and their families were interviewed (often during home visits). The families were initially recruited by the abovementioned health professionals. In a follow-up phone call from the researcher team to explain the study, families were asked if they were willing to enter the study. The inclusion criteria were children aged 10–14 and their parents participating in a childcare service that focused on improving healthy food intake, physical activity, or psychosocial well-being. The exclusion criteria were insufficient knowledge of the Dutch language and no informed consent from either parents or children to participate in the study". To understand the everyday dynamics of health behavioral change in these families, qualitative data were collected throughout the entire study period. As detailed elsewhere (Crone et al., 2021, p:3) "children and parents kept a journal and participated in interviews about their upcoming or past visit with the health promotion professional (at the beginning and end of the study). The face-to-face interviews were conducted in Dutch using a semi-structured interview schedule that assessed the families' experiences with the care professional,

the family engagement tool, and working on the family's health behavior goals. After the participants gave their consent, the interviews were audio-taped and later transcribed verbatim. Each interview lasted between 30 and 50 min. Furthermore, the research team took notes from short phone and email conversations with parents, as secondary data sources, throughout the study period."

Appendix 2 Health promotion activities and number of participants

PAR projects	What is delivered	What is targeted			Who is targeted		Number of participants		
	Activities	Physical activity	Healthy nutrition	Wellbeing	Children	Parents	Children n	Parents n	Professionals n
Family focused health promotion activities									
	Cooking class (1)		•	•	•		10	0	1
	Cooking class (1)		•	•		•	0	5	1
	Community dinner		•	•	•	•	8	57	20
	Cooking class (2)		•	•	•		10	0	1
	Cooking class (2)		•	•		•	0	5	1
	Parent-child cooking class		•	•	•	•	15	21	3
	Community summer festival		•	•	•	•	28	35	5
	Community center physical activities	•		•		•	0	29	2
	Tango lessons	•		•		•	0	16	1
	Salsa lessons	•		•		•	0	16	1

Appendix 2 Health promotion activities and number of participants (continued)

PAR projects	What is delivered	What is targeted			Who is targeted		Number of participants		
	Activities	Physical activity	Healthy nutrition	Wellbeing	Children	Parents	Children n	Parents n	Professionals n
	Physical activities Women's day	•	•	•	•	•	20	160	15
	Community sports event	•		•	•		170	50	15
	Community meeting municipality			•		•	0	2	3
	Food festival	•	•	•	•	•	60	60	30
	Yoga classes	•		•		•	0	3	1
	Community event: Wish Tree			•	•	•	3	43	42
	Get-to-know-your-neighbor			•	•	•	0	30	12
Arts based health promotion campaign									
	Family portraits of habits and life lessons	•	•	•	•	•	41	31	9

Appendix 2 Health promotion activities and number of participants (continued)

PAR projects	What is delivered	What is targeted			Who is targeted		Number of participants		
	Activities	Physical activity	Healthy nutrition	Wellbeing	Children	Parents	Children n	Parents n	Professionals n
	Poems and postcards habits and life lessons	•	•	•	•	•	80	0	6
Family engagement tool									
	Family focused approach in health promotion	•	•	•	•	•	14	14	7

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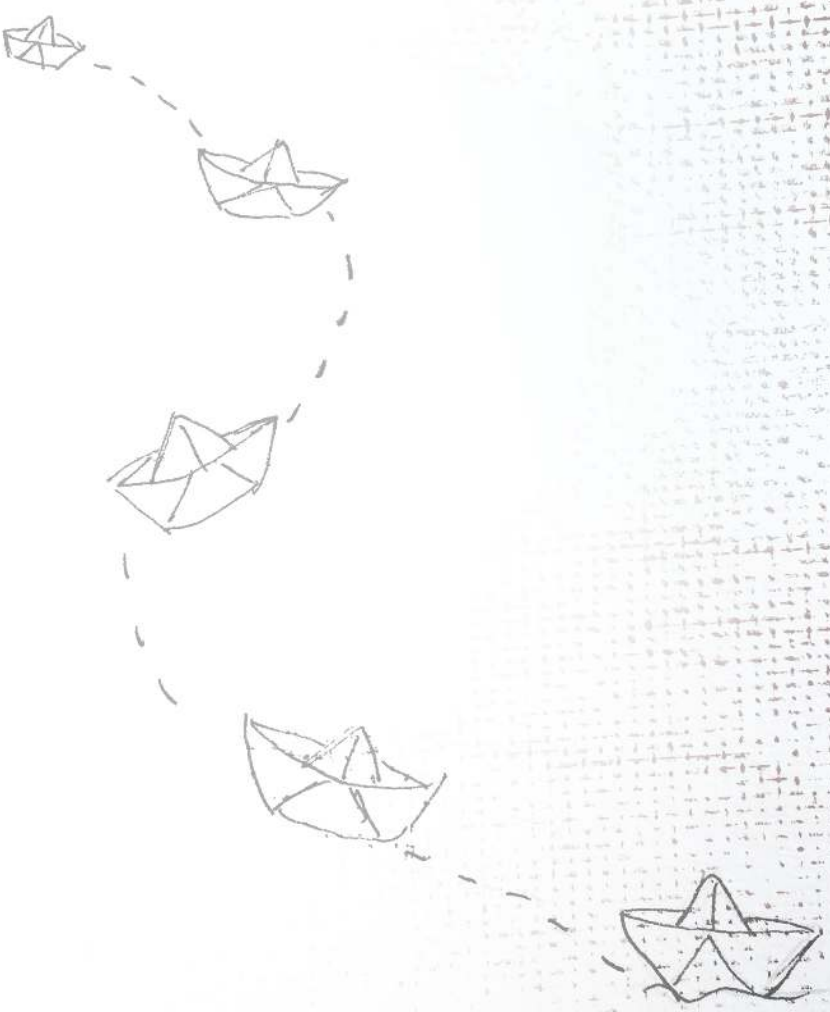


Chapter 6

General discussion

The introduction of this dissertation indicated that progress in closing the health disparity gap has been limited (Gilson et al., 2007; Mackenbach, 2012). Even in a welfare state such as the Netherlands, children continue to grow up in adverse social circumstances, which puts them at a greater risk of suffering from multimorbidity later in life. To date, efforts to address health disparities have predominantly focused on individual factors, while upstream factors such as living and working conditions are also known to affect the health of populations and local (World Health Organization, 2008). Understanding health disparities *in context* could contribute to retooling public health efforts to address persistent health inequalities and improve the outcomes of interventions (Gonzalez-Guarda, 2013; Singer, 1996).

Throughout this dissertation, we sought to holistically examine poor health outcomes across generations in Katwijk, a Dutch population that faced rapid industrial restructuring. For this analysis, we drew on syndemics theory. This framework, with roots in epidemiology as well as medical anthropology, was introduced to examine the co-occurrence and synergistic interaction of multiple diseases, while paying particular attention to mid- and upstream factors that contribute to disease clustering (Singer & Clair, 2003). The syndemic framework studies how disease clustering, interaction and dissemination are shaped by human social environments by looking at the 'prevailing structures of social relationships […] as well as socio-genetic environmental conditions' (Singer & Erickson, 2015:161)

Syndemic theory incorporates three guiding principles: the clustering of two or more epidemics, interactions among these two or more conditions and interactions between those conditions and the contextual factors that drive them. In order to gain a holistic understanding of persistent poor health in the population of Katwijk, we explored 1) indicators for syndemics and 2) conditions that drive vulnerability for clustering and adverse disease interaction over the life course and across generations. Furthermore, within the fields' ongoing search for an actionable framework to break the cycle of poor health, we examined 3) possibilities for early public health interventions.

As a whole, this dissertation explored the contribution of the syndemics framework to understanding and addressing persistent health disparities.

Since we started our studies in Katwijk in 2016, syndemics scholarship has grown immensely (Hossain et al., 2021; Mendenhall, Newfield, et al., 2022; Singer et al., 2020). For example, in the recent Covid-19 pandemic, many scholars have drawn on the syndemics framework to make sense of the amplified disease burden of the co-occurrence of Covid-19 with pre-existing health conditions (Logie et al., 2022; Mendenhall, Newfield, et al., 2022; Singer et al., 2021). The rapid uptake of syndemics theory in public health and global health scholarship gave rise to debates about the varied interpretations of the framework (Mendenhall, Newfield, et al., 2022; Mendenhall & Singer, 2019; Singer et al., 2022; Singer et al., 2020; Singer et al., 2021; Tsai, 2018) as well as discussions about the possibilities and pitfalls of integrating new theories into the framework (Sangaramoorthy & Benton, 2022). In this chapter, which discusses the main findings of the studies in relation to each other and to the literature to date, we limit ourselves to describing how a syndemics perspective contributed to discussions on persistent health disparities.

DISEASE CLUSTERING: SPECIFICITY, SEQUENCE AND EARLY SYNDEMICS

In the literature on the healthy life expectancy gap, the focus is mostly on specific diseases rather than on distinctive population-level disease clusters. The literature on multimorbidity, which investigates co-occurring diseases, on the other hand, is largely focused on the general population and predominantly based on data from the elderly (Afshar et al., 2015; Agborsangaya et al., 2012; Barnett et al., 2012; Mercer et al., 2016). In this dissertation, we looked for ways to systematically explore highly prevalent disease clusters at the population level, across age groups.

In **Chapter 2**, drawing on the syndemics framework, we analysed survey data from the adult population of Katwijk (> 19 years old). We found three disease clusters to be most prevalent, each involving combinations of psychological distress, cardiometabolic diseases and musculoskeletal pain. A syndemics approach contributes to identifying the health conditions that matter most in addressing multigenerational poor health in a specific population.

The co-occurrence of depression and pain is well established in the literature (De Heer et al., 2018; Demyttenaere et al., 2007; Lépine & Briley, 2004; Stubbs et al., 2016; Stubbs et al., 2017). The co-occurrence of pain, psychological distress, and cardiometabolic diseases led to many discussions about future research directions among our research team. For example, in our qualitative life-course study among families suffering from combinations of psychological distress, cardiometabolic diseases and musculoskeletal pain (**Chapter 3**), pain was often the first presenting symptom for both men and women. This observation is consistent with findings from a recent population-based cohort study from the UK, which identified a pattern in which chronic pain or osteoarthritis was followed by anxiety or depression (Bisquera et al., 2022). However, the same Lancet study also reported a pattern where chronic pain was preceded by obesity, diabetes and hypertension. While pain and obesity share common pathways, insights into the first presenting disease might have different implications for early intervention. Because we relied on cross-sectional data and sources, investigating disease sequence was not attainable in our study.

Furthermore, in both the quantitative and qualitative data, we found anecdotal evidence for the clustering of health conditions among adolescents. For example, in our life-course study **(Chapter 3)**, adolescents suffered from pain and/or obesity, school absence and psychological distress. This led to questions such as 'what are the possibilities for identifying early manifestations of syndemics'?, and 'how do biological, behavioural and psychosocial processes operate across the life course' (Larson et al., 2018)? Because the

quantitative youth data did not measure pain and because of the small sample in the qualitative study, we could not pursue these questions further. In sum, drawing on the syndemics framework inspired new research directions for effectively addressing persistent health disparities, highlighting that for early intervention, more (mixed-methods) life-course epidemiological research is needed.

DISEASE INTERACTION: SHOULD THIS BE ESTABLISHED IN EACH NEW POPULATION?

Psychosocial and environmental stressors can lead to a variety of physical and mental disorders, raising the question of which disease groups are a true indication of syndemics. Through assessing disease interaction, a distinguishing feature of syndemics, we explored which combinations of health conditions led to an exacerbated disease burden. In our case, this meant that we examined which combinations of frequently occurring diseases led to much lower self-rated health than would be expected based on their independent contributions to self-rated health. Using this approach, we found that psychological distress, cardiometabolic diseases and musculoskeletal pain interacted in mutually exacerbating ways, indicating a strong impairing effect when experienced together.

Our finding of disease interaction on an additive scale, argued to best mirror biological interactions (Tsai, 2018; Tsai & Venkataramani, 2016; VanderWeele & Knol, 2014), added unique empirical support for the adverse disease interaction between cardiometabolic conditions and psychological distress (Singer et al., 2022). Interaction effects on an additive scale (rather than the multiplicative scale) imply that individuals with cardiovascular diseases or pain are likely to benefit from additional screening/treatment for psychological distress. Unfortunately, we could not compare our findings with other syndemics studies of non-communicable diseases; therefore, more research is needed, and our findings need to be interpreted with caution.

Our findings prompted questions about establishing synergistic disease interactions in different populations. First, the findings provoked discussion about the generalisability of our findings. In this respect, Stall asked 'is one study that reports a positive finding enough to support syndemics theory?' (Stall et al., 2015). Relatedly, Mendenhall posed the question 'should each syndemic study start with a new slate' (Mendenhall, 2016)? We wondered if, once a disease interaction between psychological distress and cardiometabolic conditions is established, should one establish this disease interaction in each new population with similar disease clustering? Then, touching upon the theoretical underpinnings of syndemics theory: Is the disease interaction criterion built on the assumption that on the biological level, psychological distress and cardiometabolic conditions are linked differently in different contexts?

The implications of being able to build on existing evidence of disease interaction would be enormous – for example, we could use data from general practitioners (GPs), data that is less prone to the limitations of relying on self-reported cross-sectional survey data. In our study setting, it was common to express ill health in local vernacular rather than biomedical language. Therefore, the local validity of the measures for health conditions in the survey might have been limited (Weaver & Kaiser, 2020). At the time of assessing disease interaction, we did not have access to GP data containing a proxy for burden of disease—key to establishing disease interaction—which meant that we could not use these data for our syndemics studies. However, now that data on national, regional and local care use have become available, there might be more possibilities of working with GP data. Additional mixed-methods research in populations with similar disease clusters will prove critical for moving forward in understanding the importance of establishing synergistic disease interactions in each population separately.

PATHWAYS TO SYNDEMICS: HISTORICAL AND CONTEMPORARY CONTEXTUAL FACTORS

Syndemic theory is built on the idea that downstream as well as mid- and upstream factors drive disease concentration and disease interaction. Downstream factors refer to factors at the individual or family level, such as behavioural risk factors or parental ill-health. Midstream factors, such as health behavioural norms and health care organisations, are intermediate factors that affect neighbourhoods and local communities. Upstream factors refer to broader political, economic and social conditions that drive poor health outcomes. Therefore, the second research question in this dissertation concerned the (contextual) conditions that underpin vulnerability for syndemic ill health in the population of Katwijk.

To assess the processes that drive diseases to cluster in Katwijk, we used an explanatory sequential approach, which consisted of a quantitative and qualitative arm. In quantitative arm, the cross-sectional epidemiolocal study (discussed in **Chapter 2**), we examined explanatory factors for the presence of the three disease clusters. We found that clustering of psychological distress, cardiometabolic diseases and musculoskeletal pain was not only associated with age, but that clustering of these diseases was also more likely to occur among people, particularly women, whose health was impacted by not being engaged in paid work, financial stress, loneliness, limited physical activity and a BMI > 25.

In our case study in **Chapter 3**, the qualitative arm of the study, we turned our lens to shared experiences and exposures that might predispose the population of Katwijk to clustering and adverse interaction of psychological distress, cardiometabolic diseases and musculoskeletal pain. First, by adding oral histories as a syndemics research tool, we examined contextual factors that have affected family life, health and wellbeing since the 1940s. From these interviews with elderly key informants, we learned that historically,

many fishing families were exposed to seasonal food insecurity, unsafety, early losses of family members, parental absence, poor living and working circumstances, limited access to health care and a steep decline of the fishing industry due to fishing bans, quotas and outsourcing. Next, from the life-course interviews with families who suffered from the co-occurrence of psychological distress, cardiometabolic conditions and musculoskeletal pain across generations, we learned that these families commonly shared a life history of exposure to adverse social conditions and adverse childhood experiences from their early years onwards. Our findings are consistent with syndemics and life-course studies showing that (early) adverse social conditions and chronic distress play important roles in shaping poor health outcomes in adults and that social disadvantages cluster in families across generations (Melchior et al., 2007; Mendenhall, 2016; Mendenhall et al., 2017; Poulton et al., 2002; Wadsworth, 1997).

Taken together, **Chapters 2** and **3** demonstrated that both current and historical trends are key in understanding drivers of poor health on a population level. In future research, our methodology could be replicated for studying persistent poor health in populations with comparable histories of social suffering/hardship and similar social characteristics, for example, former mining and farming communities.

ASSESSING DISEASE-CONTEXT INTERACTION: METHODOLOGICAL CONSIDERATIONS

The qualitative findings contextualised the results from the quantitative study, confirming the importance of grounding quantitative epidemiological work in a detailed ethnographic study (Mendenhall, Kim, et al., 2022). Through the triangulation of qualitative data (oral histories, interviews and participative observation), we gained insights into local phenomena that may

affect disease interactions, disease experiences and possibilities for interventions in this particular context.

The value of this triangulation was evident when assessing the impact of factors such as unemployment on individuals' and families' wellbeing. If the study only relied on the variables 'financial distress' and 'not involved in paid work', as reported in the quantitative study, we would have missed key insights. One such example was that adult men who suffered from psychological distress, cardiometabolic conditions and musculoskeletal pain often had a history of working accidents and working under poor conditions. These men, who worked in blue-collar occupations that do not require a college degree, attributed their co-occurring health conditions to work accidents or poor working conditions, which negatively affected their health, for example, causing pain. In an environment that highly values hard work, perseverance and 'handling things by yourself', being unemployed or living off social benefits resulted in a great deal of psychological distress. Becoming unemployed thus emerged as a major, adverse life event in this population.

In Katwijk, the insights described above can be translated into existing interventions by, for example, screening for psychological distress when men are on sick leave due to cardiometabolic conditions or pain. Furthermore, these observations confirm that to prevent or mitigate poorer health in specific populations, solutions should not solely focus on the individual but also on the social and physical environments that might shape ill health. Our findings indicated that despite national policies for employment, occupational hazards and limited rights of blue-collar workers can be important factors in the complex pathway to syndemic ill health. Therefore, our findings supports the need for a syndemic lens to examine poor health outcomes among other populations that are vulnerable to occupational hazards, exploitation and job insecurity, such as elderly care workers (Duijs et al., 2021) or (migrant) farmer workers (Willen et al., 2017). In extension, as measures meant to mitigate occupational risks seemed to fail, research among the abovementioned populations should also include an analysis of the policy domain.

Our assessment of the disease-context interaction criterion also revealed a number of methodological challenges that need to be taken into consideration in future research. First, because we worked with data from surveys meant to monitor health across Dutch municipalities, we struggled when working with measurements that were not developed or adapted for syndemics research, a well-documented challenge (Weaver & Kaiser, 2020). For example, the surveys did not contain terminology that our study population used to refer to their health conditions, which raised questions about the local validity of the measures used. As described in **Chapter 3**, our study population commonly used local vernacular rather than biomedical language to refer to their health conditions. When queried about health conditions using biomedical terms, respondents would often answer negatively: 'no, I don't have this health condition'. However, when we used vernacular terms for those same conditions, such as 'having it in your back' or 'having to lay flat', they answered affirmatively.

Second, in examining disease-context interaction, we had to work with the contextual variables measured in the existing dataset, and we could not test other potentially important contextual factors. For example, we could not test associations with locally relevant variables such as working history, working conditions, occupation or working hours.

Third, in a community with a history of a strongly gendered division of social roles for labour and housework, one might hypothesise that there are gender-specific differences in pathways to disease clustering and adverse disease. However, because of the limited number of contextual variables available, we were not able to test this idea. In addition, as syndemics researchers—concerned with the complex interaction of environments and disease—we faced the well-described struggle of relying on datasets that mainly measure individual-level variables, leaving us unable to consider variables on other system levels (Penkler, 2022). To circumvent the abovementioned struggles, future studies can build on a recently published roadmap to adapt existing

tools to include locally relevant measures of a potential syndemic (Weaver & Kaiser, 2020).

Fourth, while our systematic study of life-course processes that are likely to create the conditions for syndemic ill health is a strength, weaving in this approach also posed a challenge. In our study, we could not validate the patterns from the qualitative data in the (much larger) sample of the pre-existing epidemiological study, a strength in other life-course-based syndemics studies that measured adverse life events in the quantitative arm of their studies (Herrick et al., 2013; Mendenhall, Kim, et al., 2022; Stall et al., 2008).

Last, while the use of a sequential explanatory design allowed us to use findings from the qualitative study in the subsequent interpretation and clarification of findings from the quantitative study, we also encountered pitfalls in working with this mixed-methods approach. In relation to generalisability, we struggled with the question 'how well does the sample for the qualitative arm represent the population in the quantitative arm' (Wilkinson & Staley, 2019; Zhou & Wu, 2022)? In our case, Katwijk has grown immensely in the past few decades, partly due to merging with surrounding municipalities. Therefore, the sample for the epidemiological study also consisted of adults from neighbouring communities, who might not share the same history or social characteristics as the former fishing families in our qualitative study, for whom we purposively sampled in a low-income neighbourhood of Katwijk. Taking into consideration that we based our analysis of **Chapter 3** on a small sample of families, it is possible there is more diversity in histories and disease experiences behind the clustering and intergenerational nature of psychological distress, cardiometabolic conditions and pain in Katwijk than the ones documented in this thesis.

SYNDEMIC VULNERABILITY ACROSS GENERATIONS: FUTURE DIRECTIONS

The third research theme in this thesis concerns the contextual conditions that drive vulnerability for disease clustering and adverse disease interaction *across generations*, which we examined through ethnographic work comprising oral histories, life-course interviews and participative observation. In **Chapter 3**, we traced salient themes and processes leading to or from persistent poor health outcomes in the life histories of seven families. To explore the intergenerational nature of syndemics, we introduced the concept of syndemic vulnerability, which we defined as 'a predisposition to the development of clustering and interacting diseases or health conditions that result from shared exposure to a set of adverse social conditions'.

This exploratory case study indicated that syndemic vulnerability is potentially intergenerational and that syndemic processes can be countered. We found four interacting themes on the pathway to poor health outcomes across generations: poor social conditions, adverse life events, learned health behaviours and sociocultural normative processes—well-documented hurdles on the path to persistent population-wide poor health outcomes (Mackenbach, 2012; Mackenbach et al., 2008). Conversely, educational attainment, continued social support and aspirational capabilities emerged as themes on the pathway to better health outcomes. Because our case study was the first to examine the intergenerational nature of syndemics, we have no comparison for the methods or the outcomes of our study; we therefore emphasise the exploratory nature of this study. With syndemics being a relatively novel framework, our findings provide directions for future research and interventions, which are described below.

SOCIALISATION: EXAMINING THE TRANSMISSION OF LIFE LESSONS AND HABITS

The findings from **Chapter 3** confirm that sociocultural processes and learned health behaviours need to be taken into consideration in future studies on the complex pathway to persistent health disparities. As our study participants frequently referred to life lessons and habits that had been passed on from one generation to the other, we indicate that socialisation as a useful focus in syndemics studies in populations with a history of social suffering.

Socialisation refers to the process, beginning in childhood, by which individuals learn and acquire the values, social norms and customs of a group or society. As described in **Chapter 3**, our interlocutors frequently spoke about life lessons that influenced how they dealt with suffering or first manifestations of ill health. For example, delayed or no help seeking for psychological distress or pain was influenced by lessons to persevere, to always be strong and to handle things by yourself, as well as the lesson to distrust health institutions. The abovementioned life lessons, passed on from one generation to the other, are likely a heritage from fishing life, which was often harsh. In those days, the ability to work hard and push through adversity worked as a safeguard, families feared the power of health institutions, and health care was too expensive for most families to access (**Chapters 3** and **5**). As untreated illness is associated with worse health outcomes (Wang et al., 2007; Wang et al., 2005), one might speculate that the life lessons to persevere and distrust health care might also be an explanatory factor for the persistence of poor health outcomes, despite the widespread availability of health care in the current welfare state.

Next, particularly in examining complex pathways to persistent non-communicable disease syndemics, our findings indicate that future studies could draw on scholarship on the relationship between people's (historical) social

conditions, social structures, feeding patterns and food practices (Delormier et al., 2009; Hoeeg, Christensen, Lundby-Christensen, et al., 2020; Visser, 2016; Visser & Haisma). As described in Chapters 3 and 5, we observed that health behaviours known to increase the risk of developing cardiometabolic conditions, pain and psychological distress—early uptake of smoking and drinking, frequently eating large volumes of foods high in fat and/sugar—were passed down from one generation to the other, often as part of rituals during family gatherings. During these gatherings with the wider family, the ability to eat a lot ('load up') was highly valued, likely a legacy from a time in which fishing life was physically strenuous and food often scarce. These observations of local food practices confirm that sociohistorical circumstances go a long way in explaining collective food and eating patterns (Delormier et al., 2009; Hoeeg, Christensen, Lundby-Christensen, et al., 2020) and add to recent literature suggesting a syndemic interaction between food insecurity and diet-related chronic diseases (Himmelgreen et al., 2022).

Taken together, our findings imply that socialisation might be a mechanism that contributes to the persistence of health disparities, thereby confirming the need to integrate theory that incorporates sociocultural norms, habits, preferences and practices in particular groups in future research (Visser, 2016; Wilderink et al., 2022). Future studies of non-communicable syndemics could weave in Bourdieu's theories of capital and habitus. Habitus, which includes acquired dispositions of behaviour and taste, is one of the sociological concepts used to study how food practices are shaped by cultural context. By integrating insights from sociological inquiry, researchers could more closely analyse people's health-related behaviours in light of intergenerational relations and prevailing sociocultural norms (Delormier et al., 2009; Huppatz, 2015; Yates-Doerr, 2020) through which vulnerability to metabolic conditions could emerge and re-emerge.

For interventions, our observations on the intergenerational transmission of local food rituals and food practices confirm the need to 'transcend the known in public health practice' (Frohlich & Potvin, 2008). We recommend

concepts that direct the conversation away from individual food choices (Hoeeg, Christensen, Lundby-Christensen, et al., 2020; Visser & Haisma; Wilderink et al., 2022; Yates-Doerr, 2020). For example, Frohlich and colleagues' "collective lifestyles" (Frohlich & Potvin, 1999) might be a more productive lens than (individual) lifestyle, as this concept encompasses shared ways of relating and acting in a given environment. Research on collective lifestyles can contribute to the understanding of local barriers and facilitators for changing food intake, knowledge needed to tailor interventions to fit into the everyday life of a specific rather than the general population. Insights into prevailing life lessons and collective lifestyles can also be used in co-designing community-based health promotion campaigns. Below, in Box 6.1 we provide an example of an arts-based health promotion campaign in Katwijk that aimed to raise awareness of habits and life lessons contributing to wellbeing and good health.

Together with families from Katwijk we co-designed the arts-based health promotion campaign 'Pass it On' (Geef het Door). Learning that in this setting it was important to focus on sources of community resilience, we focused our efforts on family habits and life lessons that contribute to wellbeing and a good health. A photographer and community artist created family portraits depicting habits or life lessons being passed on across generations. Each month, one family portrait was exhibited throughout the village, as large posters at bus stops and in places that families frequently visited, such as community centers and schools. In addition, the local newspaper printed one of the portraits every month, accompanied by an interview in which the family explained what they passed on from one generation to another. For another activity of the 'Pass it On' campaign, school children, supported by a community artist, wrote poems on habits and life lessons in their family. A selection of these poems were also printed in the local newspaper and made available as free postcards, which were also distributed in places that families frequently visited. Two family portraits and six postcards from poems by school children from the Arts Based Health Promotion Campaign 'Pass it On' are shown in this dissertation – these are exhibited in the appendix of this dissertation.

Box 6.1. Arts-based health promotion campaign 'Pass It On'

RESILIENCE: INVESTIGATING MECHANISMS THAT CAN TURN THE TIDE

Syndemics research has roots in critical medical anthropology, a branch of anthropology that seeks to understand and address the ways in which conditions of social inequality and injustice promote and enhance poor health outcomes (Singer et al., 2017). Within this scholarly tradition, a large body of literature describes how deprived and marginalised populations disproportionally suffer from poor health.

As with any other theoretical concept, we noticed that focusing on one aspect came with the risk of side-lining other aspects. In our case, we found that working within syndemics scholarship implicitly prompted an analytical focus on suffering, while similarly side-lining how populations survive. The abovementioned implicit focus on suffering occasionally led to struggles in analysis, as the stories of families in our studies also testified to a population that survived, despite duress. Focusing on the community's history of social disadvantage came with the risk of leaving other important aspects of the population untold, such as the warmth, humour, strong social support and resilience that we frequently observed during fieldwork.

In this dissertation, a comparative case study design **(Chapter 3)** contributed to exploring the life histories of families in which the pattern of poor health was discontinued. Our findings indicate that educational attainment, social support and aspirational capabilities may lead to decreasing syndemic vulnerability. While the abovementioned findings reflected those of a handful of other syndemics studies focusing on resilience, there is still a great deal to learn about the factors that can turn the tide and improve the wellbeing and health of vulnerable individuals and communities.

Taken together, incorporating resiliencies is not only important for how populations are represented in studies, but even more so because recent work underscores the importance of acknowledging communities' abilities to use available resources to respond to, withstand and recover from adverse situations (Ellis, 2019; Ellis & Dietz, 2017; Herrick, 2011; Panter-Brick, 2014; Reed & Miller, 2016; Ungar, 2012). Therefore, it would be interesting if future research aimed at breaking the cycle of poor health would synthesise the findings on resilience in syndemics studies.

More research is also needed to understand how mechanisms of resilience, such as education and aspirational capability, can be effectively strengthened in populations with a history of social deprivation. Future research could draw on the work of anthropologist Arjun Appadurai (Appadurai, 2004),

who emphasised the link between poverty and people's navigational capacity. Building on Amartya Sen's work (Sen, 1999), he cautions that capacity to aspire should not be treated as an individual trait, nor a trait that is evenly distributed in society. Rather, he argued that: "*[a]spirations are never simply individual (as the language of wants and choices includes us to think).They are always formed in interaction and the thick of social life (Appadurai, 2004:p.68). The relatively rich and powerful invariably have a more fully developed capacity to aspire, the better of you are (in terms of power, dignity and material resources), the more likely you are to […] link material goods and immediate opportunities to more general and generic possibilities and options' (Appadurai, 2004:68).*

Related to our interest in opportunities to break the cycle of persistent poor health outcomes, Appadurai's work served as a reminder that investing only in educational attainment, a commonly proposed measure to combat health disparities, will not suffice. In Katwijk, a setting where earning money was historically prioritised over earning degrees, resilience mechanisms such as aspiration and education would need to be strengthened by a mix of upstream, mid and downstream measures. In our study sample, young adults were often on their way to becoming first-generation learners—young adults who often proudly spoke of their educational dreams. For this group of first-generation learners, measures meant to make vocational and higher education more accessible did not always realise their potential. Families' fear of debt formed a barrier to applying for financial aid for higher education, or financial aid to travel to educational facilities outside the village. Prevailing age and gender expectations represented another hurdle on the way to pursuing a degree.

The abovementioned hurdles might become insurmountable obstacles for youth struggling to concentrate at school, or who are frequently absent from school due to psychological distress and/or pain or due to parental poor health—in our fieldwork, these groups often ended their education prematurely. Therefore, in order to strengthen resilience mechanisms, activities such as early mentoring by role models in schools or providing early and regular information on financial aid—common downstream

measures to support first-generation learners—need to be supplemented with policy incentives that support activities known to broaden children's horizons (reading early, school trips, spending time with families from other backgrounds), timely intersectoral collaboration for school absenteeism or children acting out at school and 'second chances' to engage in vocational or higher education, such as financial aid for continuing adult education.

TRANSLATING INSIGHTS INTO EARLY INTERVENTIONS: LESSONS LEARNED

Although the conceptual framework underlying syndemic approaches is gaining traction in studies of health disparities, applied syndemic research in public health is still in its infancy (Singer et al., 2012, 2020; Singer et al., 2021). Therefore, following the examination of indicators for syndemics, we were interested in the possibilities of translating insights into early health care interventions. In light of our aim to understand and address persistent poor health outcomes in specific populations, this meant adapting existing interventions with knowledge gained from our studies on the intergenerational nature of syndemics (**Chapter 3**). Because our findings discussed in **Chapter 3** indicated that adverse social conditions and cumulative adverse life events are important junctions on the complex pathway that leads to persistent patterns of poor health outcomes in Katwijk, we adopted a life-course approach to early intervention (64). This meant that we tailored existing health promotion interventions for children in Katwijk to start with a broad assessment of care needs and to involve both parents and children in health promotion activities.

As described in **Chapter 4**, we integrated an intergenerational approach into the GIZ, a frequently used shared tool for assessing children's care needs in the Netherlands. The family-engagement tool was piloted in health promotion programmes that traditionally directed their activities at either parents or children separately. Our mixed-methods evaluation

study showed that the family-engagement approach elicited positive effects on some families' health and wellbeing. Overall, after a consultation using the family-engagement tool, the children's physical activity improved and mothers felt more energetic. Other outcomes did not change. In addition, while goal-setting and action-planning by professionals was effective, the family-engagement tool often was used without setting specific or family goals, particularly in consultations related to being overweight.

Throughout our applied work, we observed that adopting a life-course approach to health promotion was challenging. The complexities associated with translating our findings into early interventions have not been described in the literature of non-communicable disease syndemics, but are well described in scholarship regarding (multicomponent) childhood weight management programmes, particularly when implemented in community settings (Kelleher et al., 2017; Schalkwijk et al., 2016; Steele et al., 2011). For example, while the rationale of a broad assessment of the care needs of families and family-focused health promotion was fully embraced by local professionals, meeting the various needs of both parents and children proved to be difficult. The triangulation of diary and interview data showed that health behavioural change in families was often hindered by more urgent care needs, psychosocial problems in the family, competing health beliefs, low levels of family support and low involvement of fathers (due to long working hours). For everyday practice, this meant that professionals needed to be able to take factors from different life domains into account in setting goals and plans, which is a significant challenge. In addition, we learned that professionals trained to address children's mental health were not necessarily trained to assess or discuss health behaviours with adults (and the other way around).

Further, also in line with earlier studies that focused on weight-related health promotion (Gerards et al., 2012), we observed that getting families to participate, and continue participating, in health promotion was often immensely difficult. In fact, over time, we learned that once the issue of

a child's weight was on the table, interactions between professionals and families quickly became tense. Therefore, we sought to gain a contextualised understanding of weight as a sensitive issue, which resulted in the study reported in **Chapter 5.**

Building on the notion of subversion, the ethnographic study reported in **Chapter 5** examined patterns in weight-related interactions and examined whom and what is protested against when health promotion is contested. Joking, anger, mocking and polite nodding emerged as commonplace expressions of subversion. Against the sociohistorical background of Katwijk, the study showed that subversive responses in weight-related interactions are likely underpinned by a protest against institutional indifference towards adverse social circumstances and a protest against the power of health institutions to interfere with family life. At a fundamental level, a worldview represented in health promotion interventions—individualism and self-determination—clashed with the worldview of a society that holds social cohesion, continuity and group conformity at its core.

ROADMAP FOR FUTURE RESEARCH AND INTERVENTIONS

Taken together, the studies reported in **Chapters 4 and 5** provided some important lessons for future early interventions and future research into persistent health disparities. The observations of social problems hindering families' capabilities to work on health behavioural change, as well as the observation of widespread protests against weight-related health promotions, served as a reminder of the lifestyle drift trap for applied research targeting health inequalities. Lifestyle drift refers to the tendency of institutions to focus on individual lifestyle factors rather than taking action to address fundamental, upstream causes of poor health (Popay et al., 2010). The studies in this dissertation confirm that in order to effectively address persistent poor health outcomes, clinicians, public health officials, policymakers,

civil society actors, and other key stakeholders both within and beyond the health and social domain need to synchronise their efforts (Willen et al., 2017). In addition, our findings highlight that interventions and local policies need to be based on a thorough understanding of local pathways to poor health outcomes, and tailored or developed in close collaboration with the recipient community.

The abovementioned studies, however, also showed that protective mechanisms, triggered by institutional distrust and clashes of worldviews can severely challenge collaborative approaches. To circumvent a sense of fatalism, researchers, policymakers and professionals are recommended to seek to understand the roots of and motivations for communities' protests rather than simply labelling them as non-compliance, resistance or avoidance. We also suggest that funding and research proposals for applied projects must budget extended time for community building processes to provide adequate time for the activities necessary for developing this in-depth understanding of a community.

Our observations from early interventions highlighted that multicomponent, integrated care interventions—often proposed as one of the solutions for health disparities—require complex skills. In the tailored interventions described above, professionals were required to simultaneously deal with the contents of two kinds of plates: what is served on peoples' literal plates (food), and what people had on their figurative plate (social suffering). We learned that being able to take these multiple plates into consideration required skills from multiple domains, and that professionals were often not trained in this wide variety of skills. For future interventions, this means that relying solely on professionals' previous training cannot suffice. Rather, our findings imply that the knowledge, attitudes and skills required to successfully integrate a life-course approach to health promotion need to be integrated into the curricula for both professionals working in health promotion for children, such as dieticians, sports coaches and school nurses, and those who work with adults.

Lastly, our findings confirmed that to break the cycle of disadvantage, the influence of the whole family environment needs to be taken into consideration. Specifically, our findings serve as a reminder that grandparents and fathers are important gatekeepers in the process of changing health behaviour in families (Hoeeg, Christensen, & Grabowski, 2020; Hoeeg, Christensen, Lundby-Christensen, et al., 2020). In the intervention we carried out, professionals primarily worked with mothers, who are often implicitly regarded as change agents. Our findings in **Chapter 4**, however, indicated that paternal support played also played an important role in children's behavioural change.

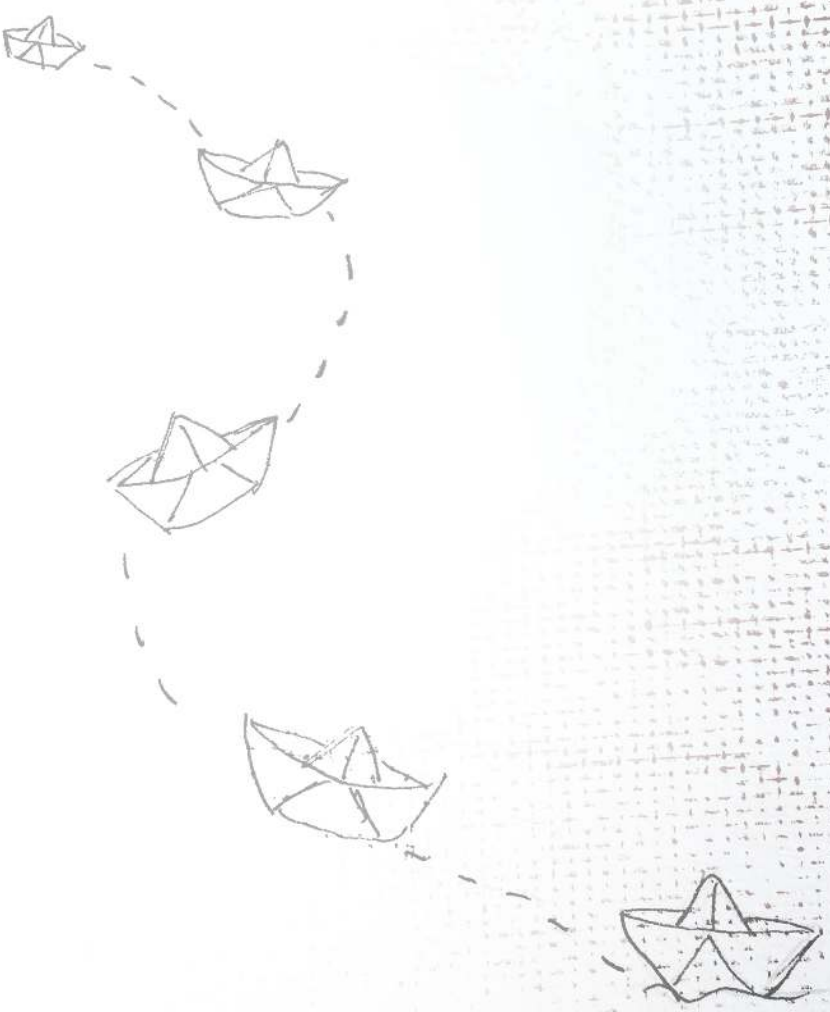
In hindsight, in the participative action-based research study that ultimately led to tailoring existing health promotion programmes, grandparents and fathers were not sufficiently represented, a limitation in our work **(Chapter 4).** Our findings, therefore, support recommendations that in order to involve fathers in tailoring or designing (culturally sensitive) interventions, recruitment strategies need to be adapted, for example, by considering the working hours of men. In addition, seeing that health promotion measures instigated tension between families and professionals, and within families, our findings confirm that in order to successfully circumvent immediate resistance, future family-focused early interventions could benefit from weaving in family systems theories.

CONCLUSION

This dissertation provides further insights into the contributions a syndemics framework can make toward understanding and addressing persistent health disparities based on the case of poor health outcomes across generations in Katwijk, a former fishing village in the Netherlands. We conclude that this framework adds to understandings of the phenomenon of poorer health expectancy and, when integrated with life-course theory, provides tools to identify past and present factors on the complex pathways to intergenera-

tional poor health. This in turn indicates potential directions for improving early interventions. Integrating concepts that incorporate socialisation and mechanisms for resilience would enable further actionability of the syndemics framework.

To effectively break the cycle of poor health outcomes, families, clinicians, public health officials, policymakers, civil society actors and other key stakeholders both within and beyond the health domain need to synchronise their efforts. Within such a multisystem approach, stakeholders need to develop an in-depth understanding of communities' history and past legacies with institutions, and professionals working in the medical and social domains need to be equipped with the necessary knowledge, attitudes and skills to successfully undertake complex community-based and family-focused interventions.



Chapter 7

Summary

ENGLISH SUMMARY

Despite decades of efforts to close the health disparity gap, progress has been limited. Drawing on syndemics theory, a framework with roots in epidemiology and medical anthropology, this dissertation seeks to understand and address patterns of intergenerational poor health in Katwijk, a former fishing village on the west coast of the Netherlands.

Chapter 1 presents our quest to effectively address persistent health disparities in a contextual and holistic way. Departing from an interdisciplinary approach, the dissertation includes quantitative and qualitative methods of data collection, such as surveys, oral histories, life course interviews, participant observation, action research, and diary methods. Throughout four studies, the thesis attends to research questions on syndemics indicators, contextual drivers for syndemics, the intergenerational nature of syndemics, and possibilities for early public health interventions in Katwijk. The overall aim of this dissertation was to study the contribution of a syndemics framework to understanding and addressing persistent health disparities.

Syndemic indicators

In Katwijk, the available existing data could not provide the information needed to assess the three criteria for syndemics. Therefore, the indicators of syndemics need to be assessed first. The cross-sectional study presented in **Chapter 2** examined the prevalence and co-occurrence of non-communicable disease among adults, estimated whether disease interaction contributed to self-rated health, and identified which contextual variables were associated with interacting clusters of non-communicable diseases. We found three disease clusters to be most prevalent, each involving combinations of psychological distress, cardiometabolic diseases and musculoskeletal pain. These three diseases were shown to interact in mutually exacerbating ways, indicating a strong impairing effect when experienced together. In addition, we found that the clustering of psychological distress, cardiometabolic diseases and musculoskeletal pain was associated with age

and was also more likely to occur among people, particularly women, whose health was impacted by not being engaged in paid work, financial stress, loneliness, limited physical activity and a BMI > 25.

As a result, we argue that for intervention, a multicomponent, ecological approach is needed. Such an approach integrates interventions directed at different domains and educates policymakers and care professionals about the social interconnectedness of psychological wellbeing, cardiometabolic and pain conditions.

Syndemic vulnerability across generations

Following the identification of the clustering and interaction of psychological distress, cardiometabolic conditions and musculoskeletal pain among adults, as described above, we were interested in the contextual conditions that drive vulnerability for disease clustering and adverse disease interaction *across generations*. **Chapter 3** presents the results of our qualitative case study exploring themes and patterns related to syndemic vulnerability across families and generations in Katwijk.

We found four interacting themes that potentially contribute to the persistence of poor health outcomes across generations: poor social conditions, adverse life events, learned health behaviours and sociocultural normative processes. Conversely, we identified educational attainment, continued social support and aspirational capabilities as themes related to decreasing syndemic vulnerability. Taken together, this study indicates that syndemic vulnerability is potentially intergenerational and that syndemic processes can be countered. We highlight the need for culturally sensitive and family-focused interventions and recommend longitudinal research focusing on unravelling the complex mechanisms underlying the clustering of psychological distress, cardiometabolic conditions, and musculoskeletal pain.

Possibilities for early public health interventions

The poor health outcomes across generations in Katwijk prompted questions about the possibilities of early intervention. **Chapter 4** describes the results of integrating an intergenerational approach to the GIZ, a frequently used and shared assessment tool for children's care needs in child preventive health care. Our mixed-methods evaluation study found that the family-engagement approach elicited positive effects on some families' health and wellbeing. Overall, after a consultation using the family-engagement tool, the children's physical activity improved and mothers felt more energetic. Other outcomes did not change. In addition, we found that the family-engagement tool was often used without setting specific or family goals, particularly in consultations related to being overweight. In identifying the intricacies of family-focused health promotion, we argue that the skills required to set goals and make plans with families need to be integrated into the curriculum for professionals working in child preventive care.

Challenges in early public health interventions

As described above, the process of restructuring early public health interventions revealed many hurdles and challenges. Getting families to participate, or continue participating, in health promotion activities for children was often difficult. In addition, weight-related health promotion was often met with a protest response. **Chapter 5** reports the results of an ethnographic study of subversion in weight-related health promotion. Building on anthropological theory, this study analysed population-wide protesting responses to weight-related health promotion. Joking, anger, mocking and noncommittal-but-polite responses were identified as commonplace expressions of subversion. In addition, the study indicated that subversive responses are likely underpinned by protests against institutional indifference towards adverse social circumstances and the power of health institutions as a result of the perceived threat to social cohesion.

The findings of this study indicate that strained sociohistorical relations between the general population and government institutions need to be considered when introducing public health interventions in historically

deprived communities. Contextualised analysis of subversive responses in health promotion can shed new light on behaviours often framed as non-compliance, resistance and avoidance. In turn, such an analysis might provide the information necessary to sensitise and tailor communication strategies in public health programmes targeting childhood obesity.

Discussion and conclusion

Chapter 6 discusses the findings of each of the above studies separately and in relation to each other, addresses new and open research questions, presents methodological reflections and highlights what the syndemic lens adds to understanding, and ultimately addressing, persistent health disparities. Finally, this chapter describes a roadmap for future research and interventions.

Taken together, the dissertation contains many valuable components:

1. It describes the three most prevalent disease clusters in Katwijk, each involving combinations of psychological distress, cardiometabolic diseases and musculoskeletal pain.
2. It confirms that psychological distress, cardiometabolic diseases and musculoskeletal pain interact in mutually exacerbating ways, and highlighted how these diseases are more likely to occur among people whose health is also impacted by financial stress, not being engaged in paid work, loneliness, limited physical activity and a BMI > 25.
3. This dissertation provides the first indication that syndemic vulnerability is potentially intergenerational, and that syndemic processes can be countered. Poor social conditions, adverse life events, learned health behaviours and normative sociocultural processes are themes on the pathway to syndemic vulnerability across generations. Conversely, educational attainment, continued social support, and aspirational capabilities emerged as themes related to decreasing syndemic vulnerability.
4. It also highlights that both current and historical trends are key in understanding drivers of specific patterns of poor health on a population level.

5. It shows that, while challenging, a family-engagement approach can elicit positive effects on families' health and wellbeing.
6. It describes challenges and hurdles for implementing family-focused health promotion for multifaceted health conditions such as childhood obesity.
7. It also identifies joking and mocking, anger and agitation, and polite yes-but-no nodding as commonplace expressions of subversions in weight-related health promotion for children.
8. And it demonstrates that in Katwijk, subversion in weight-related health promotion for children is likely underpinned by protests against institutional indifference towards adverse social circumstances, and the power of health institutions to interfere with family life.
9. This dissertation establishes that the syndemics framework adds to understanding the phenomenon of poorer health expectancy. When integrated with life-course theory, the syndemics framework provides tools to identify past and present factors on the complex pathways to persistent poor health, which in turn point at directions for countering syndemic vulnerability in families and communities.
10. It also recommends multisystem approaches, in which stakeholders develop a thorough understanding of a community's history and past legacies with institutions, and professionals are equipped with the necessary knowledge, attitudes and skills for community-based and family-focused interventions.

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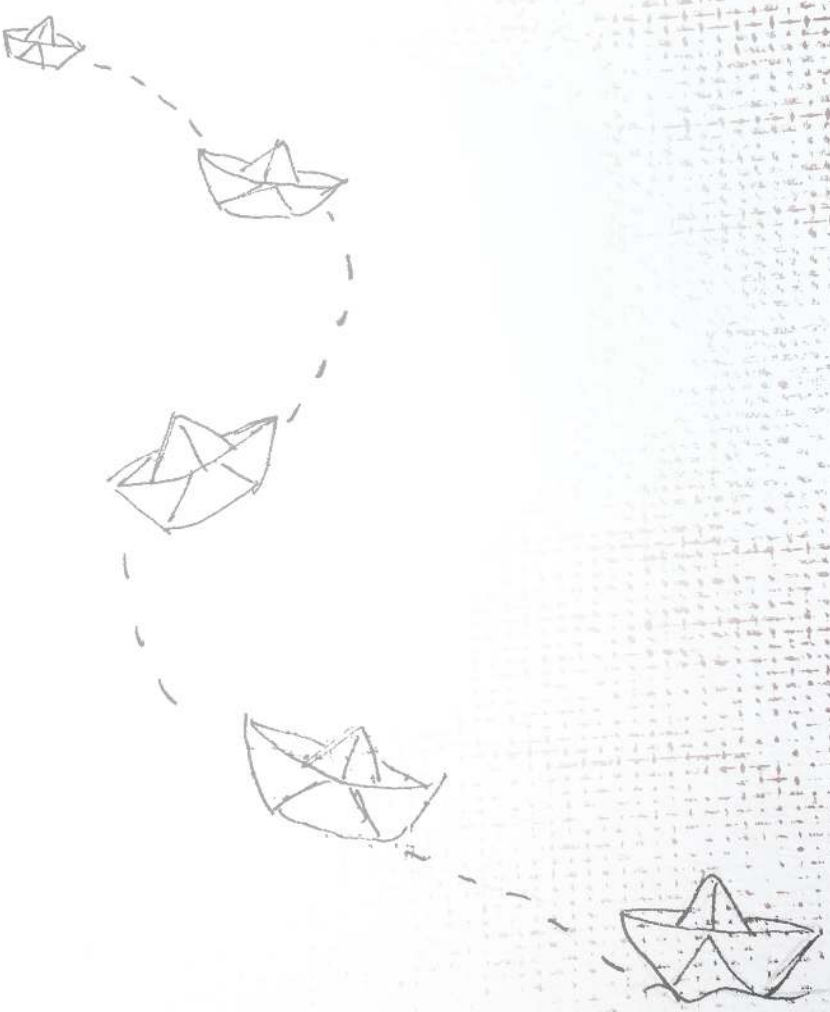

Chapter 8

Appendix

Nederlandse samenvatting
Photos and poems
'Pass It On'
List of publications
Curriculum Vitae
Dankwoord

NEDERLANDSE SAMENVATTING

Onze samenleving kent grote verschillen in gezondheid. Het blijkt moeilijk te zijn om deze gezondheidsverschillen te verkleinen. In wijken waar bewoners veel zorgen hebben over wonen, inkomen, gezin en werk bestaat een hoger risico op een slechte gezondheid. Een stapeling van gezondheidsproblemen en sociale problemen leidt tot stress en kan zorgen voor nieuwe gezondheidsproblemen. Deze opeenstapeling van gezondheids- en sociale problemen worden ook wel een 'syndemie' (syndemics) genoemd. Gestapelde problemen worden vaak doorgegeven van generatie op generatie.

Syndemisch onderzoek kijkt op populatieniveau welke aandoeningen stapelen en onderzoekt met welke contextuele factoren dit samenhangt. Tot op heden is syndemische theorie niet gebruikt om naar intergenerationele overdracht van gestapelde problemen te kijken. Daarnaast zijn inzichten uit deze theorie nog niet vertaald in een aanpak om gezondheid in gezinnen te verbeteren.

Dit proefschrift onderzoekt intergenerationele overdracht van gestapelde problemen aan de hand van syndemische theorie. De onderzoeken vonden plaats in Katwijk, een voormalig vissersdorp aan de westkust van Nederland. **Hoofdstuk 1** geeft een inleiding op de vier studies van dit proefschrift – samen kijken de studies naar indicatoren voor een syndemie, aanwijzingen voor intergenerationele overdracht van syndemieën en aanknopingspunten voor preventieprogramma's voor kinderen en gezinnen.

Indicatoren voor een syndemie

De cross-sectionele studie uit **hoofdstuk 2** keek met een syndemische lens naar de gezondheidscijfers van Katwijk. De studie onderzocht welke aandoeningen vaak samen voorkomen (clusters), welke aandoeningen elkaar versterken (interactie) en welke contextuele factoren geassocieerd zijn met de meest voorkomende clusters van aandoeningen.

Dit hoofdstuk laat zien dat de drie meest voorkomende clusters van aandoeningen in Katwijk bestaan uit een combinatie van psychologische stress, cardiometabole aandoeningen en musculoskeletale pijn. Er zijn aanwijzingen dat deze drie aandoeningen elkaar versterken. De clusters van psychologische stress, cardiometabole aandoeningen en musculoskeletale pijn zijn geassocieerd met leeftijd en komen vaker voor bij mensen – met name vrouwen - wiens gezondheid ook wordt beïnvloed door zorgen over geld, eenzaamheid, geen betaald werken hebben, beperkt bewegen en overgewicht (een BMI boven de 25). De bevindingen uit deze studie onderstrepen de noodzaak van een sociaal- ecologische aanpak en een multi systeembenadering van gezondheidsongelijkheid.

Syndemische kwetsbaarheid over generaties heen

Na het vaststellen van de opeenstapeling van psychologische stress, cardiometabole aandoeningen en musculoskeletale pijn bij volwassenen in **hoofdstuk 2**, richtte we ons op het vraagstuk van intergenerationele overdracht van syndemics. **Hoofdstuk 3** beschrijft de resultaten van een kwalitatieve, vergelijkende *case study* onder families in Katwijk.

In deze studie keken we naar gezinnen waar een stapeling van psychologische stress, cardiometabole aandoeningen en musculoskeletale pijn meer voorkomt bij de oudere generaties dan bij de jongeren generaties. Deze gezinnen werden vergeleken met gezinnen waarbij de stapeling van gezondheidsklachten over de generaties heen voorkomt. Zo zochten wij naar overeenkomsten en verschillen tussen de generaties binnen een familie. Wij vroegen ons af: welke sociale mechanismen dragen mogelijk bij aan kwetsbaarheid voor overdracht van gestapelde problemen en welke sociale mechanismen dragen mogelijk bij aan het voorkomen van gestapelde problemen?

We vonden vier op elkaar inwerkende thema's die mogelijk bijdragen aan het voortbestaan van gestapelde problemen over de generaties heen (aanhoudende syndemische kwetsbaarheid). Deze vier thema zijn: ongunstige sociale omstandigheden, nare levensgebeurtenissen, aangeleerd gezondheidsgedrag

en sociaal-culturele normatieve processen. Omgekeerd identificeerden we onderwijs, sociale steun en het vermogen te dromen als thema's die verband houden met afnemende syndemische kwetsbaarheid.

Dit hoofdstuk beschrijft aanwijzingen dat syndemische kwetsbaarheid over de generaties heen kan blijven bestaan én dat deze kan worden doorbroken. Voor preventieprogramma's onderstrepen de bevindingen van deze studie het belang van een gezinsgerichte- en cultuursensitieve aanpak. Om de complexe mechanismen die ten grondslag liggen aan de stapeling en overdracht van psychologische stress, cardiometabole aandoeningen en musculoskeletale pijn te ontrafelen, pleiten we voor meer longitudinaal onderzoek.

Aanknopingspunten voor preventie

Gezondheidsbevorderende programma's werken tot op heden nauwelijks gezinsgericht. Het aanbod is vaak gericht op één generatie: op kinderen of op volwassen. **Hoofdstuk 4** beschrijft een studie waarin een gezinsbenadering werd geïntegreerd in bestaande preventieprogramma's voor kinderen in Katwijk. In preventieprogramma's gericht op voeding, bewegen en welzijn van kinderen (10-14 jaar) en hun gezin werd de gesprekstool Gezamenlijk Inschatten Zorgbehoeften (GIZ) ingezet. De GIZ is een veelgebruikt gespreksinstrument om de zorgbehoeften van kinderen en het gezin in de jeugdgezondheidszorg in kaart te brengen.

Uit ons *mixed-methods* evaluatie onderzoek bleek dat de GIZ Gezinsbenadering positieve effecten had op de gezondheid en het welzijn van een aantal gezinnen. Over het algemeen gingen kinderen meer bewegen en voelde moeders energieker na een gesprek met behulp van GIZ. De andere uitkomsten veranderden niet. In de studie zagen we ook dat de GIZ vaak werd gebruikt zonder specifieke doelen voor het gezin te stellen, met name in gesprekken rondom overgewicht.

Deze studie laat zien dat een gezinsgerichte gezondheidsbevordering niet eenvoudig is en schets wat een dergelijke benadering complex kan maken.

De bevindingen uit deze studie onderstrepen het belang van opleiden in gezinsgericht werken. Daarnaast is er in de opleiding van professionals die zich richten op leefgewoonten en preventie meer aandacht nodig voor doelen opstellen en actieplannen maken, samen met gezinnen.

Uitdagingen voor preventieprogramma's

Hoofdstuk 4 liet zien dat organiseren van gezinsgerichte gezondheidsbevordering complex kan zijn. Het was voor gezinnen vaak moeilijk was om deel te (blijven) nemen aan preventieprogramma's gericht op voeding en bewegen. Deze gewichtsgerelateerde preventieprogramma's riepen regelmatig reacties van protest op. De etnografische studie in **hoofdstuk 5** bestudeert deze reacties van protest het licht van de geschiedenis van Katwijk.

Om te bestuderen hoe en waarom een populatie met protest kan reageren op preventie activiteiten, werd in deze studie gebruik gemaakt van antropologische theorie over alledaagse manieren waarop groepen zich verzetten tegen macht (subversie). Voortbouwend op het werk van psychiater en medisch antropoloog Arthur Kleinman stelt dit onderzoek de vraag 'wat hebben mensen, als individu en als groep, te verliezen, als ze meedoen aan gewichtsgerelateerde preventie?'.

De etnografische studie identificeerde grapjes en spot, boosheid en agitatie en beleefd instemmen als alledaagse uitingen van subversie in gewichtsgerelateerde preventie. Onderwerpen zoals voeding, bewegen of gewicht werden vaak direct verbonden aan machtsuitoefening door de staat. In het licht van de geschiedenis van Katwijk lijken de protesterende reacties op gewichtsgerelateerde preventie een reactie te zijn op ervaren institutionele onverschilligheid ten opzichte van slechte leefomstandigheden. In een omgeving waarin eten families samenbrengt, kunnen de protesterende reacties ook duiden op verzet tegen overheidsbemoeienis met het gezinsleven (staatspedagogiek) en het beschermen van sociale cohesie.

Deze studie laat zien dat socio-historische relaties een rol kunnen spelen in gezondheidsbevordering voor kinderen. De bevindingen van deze studie werpen een nieuw licht op gedrag dat dikwijls als ' niet willen', 'weerstand' of 'zorgmijding' gezien wordt. Onderzoek naar alledaagse vormen van verzet kan onthullen wat er op het spel staat bij deelname aan preventieprogramma's en kan bijdragen aan het ontwerpen van preventieprogramma's die aansluiten bij de behoeften en leefwijzen van groepen en gezinnen.

Discussie, conclusie en aanbevelingen

Hoofdstuk 6 bespreekt de bevindingen van elk van de bovenstaande onderzoeken afzonderlijk en in relatie tot elkaar, identificeert nieuwe onderzoeksvragen, presenteert methodologische reflecties en beschrijft wat een syndemische lens toe zou kunnen voegen aan het begrijpen en aanpakken van gestapelde problemen in gezinnen. Ten slotte wijst dit hoofdstuk richtingen aan voor toekomstig onderzoek en interventies.

Samengevat laat het proefschrift het volgende zien:

1. De drie meest voorkomende clusters van aandoeningen in Katwijk omvatten steeds een combinatie van psychologische stress, cardiometabole aandoeningen en musculoskeletale pijn.
2. Psychologische stress, cardiometabole aandoeningen en musculoskeletale pijn kunnen elkaar versterken. Deze drie aandoeningen zijn geassocieerd met leeftijd en komen vaker voor bij mensen – met name vrouwen - wiens gezondheid ook wordt beïnvloed door zorgen over geld, eenzaamheid, geen betaald werken hebben, beperkt bewegen en overgewicht (een BMI boven de 25).
3. Syndemische kwetsbaarheid kan over de generaties heen blijven bestaan én kan worden doorbroken Een complex samenspel van ongunstige sociale omstandigheden, nare levensgebeurtenissen, aangeleerd gezondheidsgedrag en sociaal normatieve processen kenmerkt levensgeschiedenissen van families waarbij syndemische kwetsbaarheid van generatie op generatie wordt doorgegeven. Onderwijs, sociale steun en het vermogen

om te dromen vermogens kwamen naar voren als thema's die verband houden met afnemende syndemische kwetsbaarheid.

4. Historische trends zijn essentieel zijn voor het begrijpen van oorzaken van specifieke patronen van slechte gezondheid op populatieniveau.
5 De vervlechting van de GIZ Gezinsbenadering in preventieprogramma's– hoewel uitdagend – kan positieve effecten hebben op de gezondheid en welzijn van het gezin.
6. Hindernissen in het implementeren van een gezinsgerichte gezondheidsbevordering bevestigen dat overgewicht bij kinderen een veelzijdig gezondheidsfenomeen is.
7. Gewichtsgerelateerde gezondheidsbevordering kan reacties van protest oproepen. Grappen en spotten, woede en agitatie en beleefd knikken kunnen alledaagse vormen van verzet en ondermijning zijn. tegen institutionele onverschilligheid of verzet tegen staatspedagogiek zijn.
8. Een vervlechting van een levensloopbenadering in syndemische theorie stelt in staat om te identificeren welke sociale mechanismen gedurende het leven van invloed zijn op het ontstaan en voortbestaan van gestapelde problemen. Deze levensloopbenadering maakt het tevens mogelijk om de sociale mechanismen te ontrafelen die bijdragen aan het doorbreken van intergenerationele patronen van gestapelde problemen. Kennis over de relevante sociale mechanismen kan aanknopingspunten bieden voor preventiemaatregelen in het beleids-, sociale- en medisch domein.
9. Voor het begrijpen en aanpakken van intergenerationele overdracht van gestapelde problemen is een grondig begrip van de lokale geschiedenis en van socio-historische relaties onmisbaar. Syndemische theorie maakt het mogelijk om gezondheidsuitkomsten in het licht van de (historische) leefomgeving van een gemeenschap te begrijpen.
10. De bevindingen uit dit proefschrift bevestigen dat persisterende gezondheidsverschillen vragen om een brede aanpak waarin lokale overheden, beleidsmakers, welzijns- en gezondheidsorganisaties, professionals uit het medische en sociaal domein en mensen om wie het gaat samenwerken. Verder onderstreept dit proefschrift dat gezinsgerichte gezondheidsbevordering complex kan zijn. Er wordt aanbevolen om in

opleidingen aandacht te besteden aan intergenerationele overdracht van gezondheid en om professionals toe te rusten met kennis, attitudes en vaardigheden om aan te sluiten bij leefgewoonten en leefwerelden van kinderen en hun familie.

PHOTOS AND POEMS FROM THE 'PASS IT ON' CAMPAIGN

Campagne "Geef het door"

Community artist Sylvia Bos ontwierp en begeleidde de campagne 'Geef het door'. Onder leiding van taalkunstenaar Iris de Ruiter deden kinderen van de basisschool mee aan een gedichtenproject. In de gedichten schreven kinderen over een familielid waar zij trots op zijn. Fotografe Natacha Hulsebosch nam foto's van inspirerende gezinnen en situaties in Katwijk.

De gedichten en foto's laten zien wat er van (groot)ouder op kind wordt doorgegeven. De situaties zijn soms heel alledaags. Wat doorgegeven wordt lijkt vanzelfsprekend, maar is juist heel bijzonder.

De Geef het door-campagne was onderdeel van het project Wijk in beweging, een samenwerkingsproject tussen het Leids Universitair Medisch Centrum (LUMC) en het Welzijnskwartier. Het Wijk in Beweging project werd gecoördineerd door Anya van Hees en Marloes de Mooij.

Papa, mama en mijn broers aan tafel
Lekker gezellig eten met z'n allen
Mijn vader, mijn moeder,
mijn broers en het eten

Papa, mama en mijn broers aan tafel
Mijn vader en mijn moeder praten
Ik voel me gelukkig,
ze zorgen heel goed voor mij

Papa, mama en mijn broers aan tafel
Ik praat met mijn moeder

Desiree, 11 jaar


Mijn oma in de keuken
Elke keer kookt zij
Iets lekkers naast mij
Mijn oma in de keuken
Ik ruik de geur van de taart
Dat wordt genieten
Mijn oma in de keuken
Het blijft beter dan bieten
Sander, 12 jaar


Mijn opa in mijn huis
Hij is aan het zitten
Mijn opa die gezond is
en geen zieke opa
Mijn opa in mijn huis
Vogels die zingen en een lekkere taart
Hij bleef vechten tegen de kanker
Hij heeft het overleefd
Mijn opa in mijn huis
Hij zit daar ontzettend lekker
Keano, 11 jaar

Shir-el, 11 jaar

Narges, 12 jaar


GEEF HET DOOR,
SAMEN UITWAAIEN
WWW.WELZIJNSKWARTIER.NL
FACEBOOK.COM/WELZIJNSKWARTIERINDEWIJKEN
WIJK IN BEWEGING
VOOR EEN ACTIEVE EN GEZONDE WIJK


GEEF HET DOOR,
SAMEN PRATEN
WWW.WELZIJNSKWARTIER.NL
FACEBOOK.COM/WELZIJNSKWARTIERINDEWIJKEN
Wijk in Beweging
VOOR EEN ACTIEVE EN GEZONDE WIJK

PEER-REVIEWED PUBLICATIONS

Slagboom, M.N. (2022). Just one more cookie: An ethnographic study of subversion in weight-related health promotion in a Dutch fishing community. *SSM-Qualitative Research in Health*, Article 100206, https://doi.org/10.1016/j.ssmqr.2022.100206

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Slagboom, M. N., Reis, R., Tsai, A. C., Büchner, F. L.,van Dijk, D. A., & Crone, M. R. (2021). Psychological distress, cardiometabolic diseases and musculoskeletal pain: A cross-sectional, population-based study of syndemic ill health in a Dutch fishing village. *Journal of Global Health*, 11, Article 04029, https://doi.org/10.7189/jogh.11.04029

Slagboom, M. N., Bröer, C., & Berg, J. (2021). Negotiating ADHD: Pragmatic medicalization and creolization in urban India. *Social Science & Medicine*, 289, Article 114400, https://doi.org/10.1016/j.socscimed.2021.114400

Slagboom, M.N., Crone, M.C & Reis, R. (2020). Exploring syndemic vulnerability across generations: A case study of a former fishing village in the Netherlands. *Social Science & Medicine,* Article 113122, https://doi.org/10.1016/j.socscimed.2020.113122

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Reports

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Slagboom, M.N., Crone, M.R., Reis, R., Belo, J., Lapijan, I., Sijpestein, F., Mejan, P. (2016) Profielfoto Katwijk Noord, *Leids Universitair Medisch Centrum*

CURRICULUM VITAE

Nienke Slagboom (1984)—born in Apeldoorn, raised in South Africa—is a Rotterdam-based medical anthropologist. She was trained as a drama therapist (2007, cum laude) at the Hogeschool Zuyd, Heerlen. She earned her master's of science (MSc) in medical anthropology and sociology at the University of Amsterdam (UvA, 2014).

After completing her training in drama therapy, she worked in various clinical settings: in child and youth psychiatry, adult psychotherapy, and specialized care for people with learning disabilities. She was also a lecturer in the art therapy program (BA, Hogeschool Zuyd) and pedagogics program (BA, Fontys) between 2007 and 2009. From 2010 to 2012, Nienke was involved in a participatory action research project incorporating mental health interventions into community-based youth programs in disadvantaged neighborhoods in Maastricht, organized by the Research Group for Art Therapy (KENVAK). During this period, she observed firsthand the intergenerational nature of mental health issues, and the clustering of (mental) health and social problems. This catalyzed her interest in intergenerational health problems and desire to understand the systemic aspects of social suffering.

As a medical anthropologist, she worked as an ethnographer at the UvA, studying the rise of attention deficit hyperactivity disorder in children in urban India. She then traded the Indian metropolis for the beaches of Katwijk in 2015, becoming a researcher at the Department of Public Health and Primary Care (PHEG) at Leiden University Medical Centre (LUMC) focusing on intergenerational health disparities. At LUMC, Nienke has been part of interdisciplinary teams that have successfully won two research grants. The first, from Foundation Nuts Ohra (principal investigator: Professor Dr. Ria Reis) enabled her PhD research; the second, an NWA research grant from the Dutch Research Council (principal investigator Professor Dr. Jet Bussemaker) for improving the health of people in low socioeconomic positions allowed her to continue her research work at PHEG LUMC. Currently, she is

working as a post-doctoral researcher on the research project "Countering Syndemic Vulnerability: A Community Resilience Approach (2022–2026)" and is involved in supervising two PhD students. At the LUMC Health Campus, she is also the coordinator of the participatory action research project "Unplanned Pregnancies in The Hague: Strengthening Care and Interdisciplinary Collaboration (2021-2025)."

In addition to clinical work and research, Nienke has been involved in teaching activities. She worked as Coordinator of Applied Research at the Hogeschool Arnhem and Nijmegen and developed curricula for mental health professionals as a self-employed educational consultant (2012-2016). At present, she is a lecturer in behavioral science and communication at the LUMC Faculty of Elderly Care Medicine, as well as the coordinator of the qualitative research program for the LUMC graduate school.

From her interest in bridging worlds and disciplines, Nienke has also been involved in coordinating the anthropology of child and youth journal club (AIGDH, LUMC, UVA) and the Leiden University Medical Anthropology Network (LUMAN). As an advocate for knowledge valorization, she is a guest lecturer in various BA and MA programs and on an advisory board for shared decision making in youth care, at the Dutch Youth Institute (NJI). Nienke and co-researchers disseminate their work through games, podcasts and arts-based campaigns.

DANKWOORD (ACKNOWLEDGEMENTS)

It takes a village to raise a doctor in philosophy. Een proefschrift is het werk van velen. In dit meest gelezen hoofdstuk wil ik mijn dank uitspreken aan eenieder die dit boek mogelijk maakte.

Aan iedereen met wie ik een stukje mocht oplopen

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Het Welzijnskwartier, de gemeente Katwijk en GGD Hollands Midden maakte dit onderzoek mogelijk.

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