ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics
Bachelor Thesis Economics & Business Economics

Equal Opportunities for All: Examining Participation Determinants in Addressing Opportunity Inequality in the Netherlands

Abstract

This study investigates the pressing issue of opportunity inequality in the Netherlands and seeks to provide valuable insights into the efficacy of targeted intervention programmes that promote overall child development and reduce inequality. This research provides policymakers, educators, and researchers with valuable knowledge by examining the factors associated with the implementation of these initiatives in municipalities to combat early childhood inequality. Using an exploratory correlation analysis, the study unveils significant findings. Different programmes exhibit varying degrees of association with specific factors, highlighting the importance of keeping each programmes' target population into account. In addition, certain programmes exhibit stronger correlations, emphasising their reliance on a quantitative approach to decision-making, whereas others prioritise qualitative factors. These findings enhance the comprehension of the factors that influence programme implementation and shed light on the complex dynamics of addressing opportunity inequality in the Netherlands. In consideration of the limitations inherent to this study, additional research is suggested to verify the findings.

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Date final version: 06/08/2023

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I.   Introduction

The significance of egalitarianism in the Dutch context is emphasized by van der Waal et al.'s (2010) exhaustive study, reaffirming the nation's egalitarian reputation. According to van der Waal et al. (2010) Egalitarian principles promote social cohesion, inclusion, and harmony by advocating for an equitable distribution of resources and opportunities. Furthermore, it also fosters economic stability, longevity, and aligns with democratic values, ensuring equal rights for all citizens (van der Waal et al., 2010).

Opportunity inequality, a complex problem, refers to unequal opportunities based on socioeconomic or ethnic origin (Roemer & Trannoy, 2015). It affects individuals and society by limiting access to education, healthcare, housing, and employment opportunities, perpetuating poverty and exclusion (Roemer & Trannoy, 2015; Arneson, 1989). According to the Dutch Education Inspection's report in 2016, opportunity inequality is increasing in the Netherlands, necessitating collaboration among stakeholders to address the educational divide (Ministry of Education, Culture, and Science, 2016). Zumbuehl & Dillingh (2020) investigated the consequences of opportunity inequality, revealing disparities in academic performance and social mobility for children from disadvantaged backgrounds. Limited access to quality education affects future prospects and perpetuates poverty and inequality (Zumbuehl & Dillingh, 2020). Moreover, opportunity inequality leads to unequal access to resources, hindering economic development and contributing to income disparity and social divisions (Zumbuehl & Dillingh, 2020; Infographic StevigOuderschap En VZ - NCJ, 2022). These findings are not unique to the Netherlands; they are also found in international research (Marrero & Rodríguez, 2012 & 2013).

To cultivate a more equitable society and ensure equal access to resources and opportunities, the Dutch government and youth healthcare organizations have launched several initiatives. Stevig Ouderschap (SO), VoorZorg (VZ), and the Alliance of Equal Opportunities (Gelijke Kansen Alliantie, GKA) are three noteworthy programs aimed at addressing challenges in family support, child development, and educational equality. SO focuses on providing additional support to expectant families through personalized home visits, enhancing parents' knowledge and skills for a healthy upbringing (2023, Stevig Ouderschap - NCJ). VZ provides intensive support to expectant women and vulnerable families through specialized nurses, aiming to prevent child maltreatment and promote the well-being of both mother and child (VoorZorg - NCJ, 2023). The GKA programme employs a collaborative strategy, partnering with municipalities and schools to combat educational inequality and promote equal opportunities for all students. By tailoring data-driven interventions to the unique challenges of each community, the GKA aims to eliminate disparities and establish a more equitable educational environment. Since the implementation of the Jeugdwet in 2015, municipalities have been granted the freedom to determine whether to purchase or participate in child welfare and support programs. This

change in policy recognizes the significance of localized solutions, taking into account the diverse needs and circumstances within different municipalities (Jeugdwet | Nederlands Jeugdinstituut, n.d.).

This study documents municipal characteristics associated with municipal participation in programmes targeting opportunity inequality, and how these determinants may differ across programs. Through this investigation, valuable insights will be gained for policymakers, practitioners, and stakeholders involved in promoting equal opportunities in the Netherlands.

Two interviews were conducted to obtain a more in-depth understanding of how the various programmes operate and to gain expert insight into the potential limitations of the research and anticipated results. Specifically, an interview was conducted with the Dutch Centre of Youth Health (Nederlands Centrum Jeugdgezondheid, NCJ), which holds responsibility for the implementation of SO and VZ programmes. Dr. Merian Bouwmeester, a researcher and advisor at NCJ, and Yael van der Horst, a research intern at NCJ, were the interviewees. Additionally, Anita Duineveld, the GKA region coordinator of Amsterdam and Den Hague, was also interviewed.

Based on the insights gained from the interviews, it is hypothesised that for the SO and VZ programmes, particularly the statistics regarding the early stages of a child's life, such as life expectancy at birth and number of child abuse notifications at the national hotline, are expected to exhibit strong correlations with the participation in these programmes. In addition, the spending on youth healthcare is likely to be strongly correlated, and this correlation is exacerbated if the municipality places a high priority on preventive measures. Furthermore, It is anticipated that the correlation values between SO and VZ are comparable due to their similar underlying principles, with the distinction that SO screens for child maltreatment, whereas VZ screens for different variables.

Concerning the GKA programme, it is hypothesized that participation in the programme is primarily associated with socio-economic and educational variables. Additionally, the presence of inequality of opportunity within the municipality's coalition agreement plays a significant role in the decision-making process. Considering the long-term educational impact on children born into disadvantaged families, which SO and VZ focus on, it is anticipated that there exists a correlation between the GKA programme and the other two aforementioned programmes.

It is essential to recognise that the decision-making process in this context is intricate, as it involves both quantitative and qualitative factors. Although the quantitative exploration analysis conducted in this study is insightful, it does not highlight the complexity of the decision-making process involved in these programmes.

II.   Literature review

In the context of addressing inequality in early childhood for children in the Netherlands, previous studies have indicated the effectiveness of quality and targeted intervention programmes (Zumbuehl & Dillingh, 2020). It has been recognized that investing in children's talents at the appropriate stage can promote their overall development. Throughout childhood, there are various circumstances and opportunities that can significantly impact children's growth and provide a window for intervention. These opportunities encompass early educational experiences, access to quality healthcare, supportive family environments, community engagement, and targeted interventions tailored to the specific needs of children. Additionally, socioeconomic factors, such as income inequality and parental employment, can greatly influence a child's development and create avenues for intervention. Furthermore, transitions between educational stages, such as preschool to primary school or primary school to secondary school, present critical junctures where interventions can mitigate the effects of inequality and promote positive outcomes for children.

According to international literature, policies hold the potential to create a meaningful impact (Zumbuehl & Dillingh, 2020). To achieve this, the implementation of high-quality and targeted programmes on a significant scale becomes imperative. Successful foreign initiatives have often concentrated their efforts on a specific subset of highly disadvantaged children. However, there remains a knowledge gap regarding the extent to which existing programmes and available resources in the Netherlands contribute to reducing inequality. Consequently, further research is required in this regard.

Presently, the Netherlands the three most relevant nationwide programmes which aim to address opportunity inequality within the country are SO, VZ, and GKA. This section provides a detailed examination of the operation of these programmes, shedding light on their efficacy and impact. In Table 1, an overview of the three programmes is provided summarising the key information.

Table 1. Summary table of SO, VZ and GKA programmes

	SO	VZ	GKA
Founding Year	2017	2021	2016
Goal	Promote healthy, safe, and successful upbringing of children	Promote healthy, safe, and successful upbringing of children	Fight educational and labour market opportunity inequalities
Target Group	Pregnant women and/or families facing more challenging circumstances	Intensive long-term support for pregnant women and/or families in extremely vulnerable situations	Municipalities facing inequality of opportunity in education
Time Limit	Until the child reaches the age of 2	Until the child reaches the age of 2	Unlimited
Method	Home visits by Youth Healthcare professionals (JGZ professionals)	Home visits by program-specific professionals (trained facilitators, psychologists, and counsellors)	Specially designed intervention for school and local communities
Frequency	6-10 visits	40-60 visits	Depends on the intervention
Monitoring Organization	Dutch Centre of Youth Health (Nederlands Centrum Jeugdgezondheid - NCJ)	Dutch Centre of Youth Health (Nederlands Centrum Jeugdgezondheid - NCJ)	Ministry of Education, Culture, and Science

Note. The table represents a comparison of the SO, VZ, and GKA programmes based on various criteria such as their founding year, goals, target groups, time limits, methods of implementation, frequency of visits, and the monitoring organizations responsible for overseeing these programmes.

Stevig Ouderschap & VoorZorg

SO is a preventive intervention programme that provides additional support to families facing more challenging circumstances through home visits (Stevig Ouderschap - NCJ, 2023). The official programme report by Bouwmeester-Landweer (2017) emphasizes the primary goal of promoting a healthy and secure upbringing by enhancing parents' knowledge of child development, attachment, communication, self-confidence, self-awareness, and the importance of building a supportive network. The target group for SO consists of children at risk of abuse, signals to detect this include parents who have experienced adversity, personal problems, lack of support, or demanding parenting situations, representing approximately 5-7% of the population (Stevig Ouderschap - NCJ, 2023). The home visits involve 6 postnatal visits until the child reaches the age of 2, and the parent(s) have the option to choose for 4 prenatal supplementary visits which begin at 16 weeks of pregnancy. During these visits, various themes are addressed, including positive reinforcement, (health) education, behavioural observation, modelling of appropriate behaviour, pedagogical advice, motivational conversations, and providing attention and support to foster connection.

VZ is a preventive intervention programme specifically designed for pregnant women and/or families in extremely vulnerable situations (VoorZorg - NCJ, 2023). This is programme is the equivalent of the Nurse-Family Partnership Programme from the United States, which is proven to have a prominent

impact on the development of children (Heckman et al., 2017). The primary goal of the VZ programme is to prevent child abuse and severe developmental problems in young children. VZ aims to improve the pregnancy and childbirth process for both the mother and child, promote the health and development of the child, and enhance the personal development of the mother, including her educational and employment opportunities (van der Meulen, 2021). The target group of VZ includes pregnant women facing a multitude of challenges, often characterized by being single, having a low income, limited education, a history of abuse or neglect during their childhood (VoorZorg - NCJ, 2023). Women dealing with other problems and risk factors such as lack of social support, substance abuse, domestic violence, and more are also included. The programme involves more intensive support, compared to the SO programme, through 40-60 home visits conducted by specialized VZ nurses, starting as early as possible during pregnancy, and continuing until the child is two years old. These home visits focus on promoting health, providing lifestyle, giving parenting support, assisting with caregiving, and implementing structured strategies to change behaviours.

The regional youth healthcare organisations (JGZ-organizations) are responsible for the implementation of the programmes within the municipalities. In the interview with Dr. Merian Bouwmeester, she revealed that the municipalities' policy makers are rarely the party initialising the procedure of implementing the programme in their municipality. In her working paper, van der Horst (2023) conducts interviews with 16 policymakers from 14 municipalities regarding their perspectives on decision-making regarding home-visiting interventions such as SO and VZ. The qualitative study revealed the two primary starting points for assisting policy officers with intervention decision-making. First, municipalities can be provided with additional information regarding SO and VZ, including information regarding their efficacy and cost-effectiveness. In addition, the distinctions between these home-visiting interventions and the JGZ's prenatal home visits should be highlighted.

In the article "Ouders in hun kracht met Stevig Ouderschap" by Bouwmeester (2014), the satisfaction of parents participating in the SO programme is discussed. It presents data from evaluations completed by families who participated in the programme, indicating high levels of satisfaction. The majority of the families found the home visits to be meaningful and expressed appreciation for the support provided by the visiting nurses. The article concludes that SO is a personalized approach that is well-received by parents, with an average rating of 8.2 out of 10 for the programme overall. Additionally, the programme had the following positive long-term impacts: a 15% more positive view on child development, a 14% decrease in the risk of parenting problems, a 13% reduction in social network support, 7% more realistic expectations of their own child, and 11% more parents report being capable of handling the task of parenting well (Infographic - Stevig Ouderschap, 2019).

According to the VZ evaluation study of Andeweg & Sondeijker (2020), both the VZ nurses (VoorZorgverpleegkundigen) and the clients have reported positive experiences and satisfaction with the programme. The clients have expressed appreciation for various aspects of VZ, including the support provided for speech and language development in children, improvement in parenting skills, and collaboration with local service providers. In addition, the programme yielded the following outcomes: an 8% decrease in reports of child abuse, an 11% reduction in cases of physical domestic violence, an 8% increase in the duration of breastfeeding for over 6 months, and an 8% decline in smoking during pregnancy (Infographic - VoorZorg, 2021).

Alliance of Equal Opportunities

The GKA programme, launched by the Dutch Ministry of Education, Culture, and Science, is dedicated to combating inequality in education and promoting equal opportunities for all students, regardless of their socioeconomic origin (Ministerie van Onderwijs, Cultuur en Wetenschap, 2020). Guided by the fundamental principle that children with similar abilities have the right to equal opportunities, the GKA emphasizes that their heritage, parental education level, or socioeconomic situation should not hinder their academic performance. As stated in the letter from Minister Jet Bussemaker and State Secretary Sander Dekker to the Dutch Parliament on October 31, 2016, "Every child, regardless of their background, should be able to fully develop their talents" (Kamerstuk 34550-VIII, Nr. 16, 2016). This quote serves as a poignant reminder of the core mission of the GKA. The programme concentrates on fostering a comprehensive partnership between schools, families, and communities to address the issue of unequal opportunities, specifically for students. In contrast, the participation in the GKA is on a municipal level rather than geared towards the individual like in the SO and VZ. This is done by means of collaboration with other ministries and municipal governments to develop local agendas for implementing data-driven interventions to fight the specific struggles the municipality is facing.

The Ministry of Education, Culture, and Science collaborates with municipalities to establish an agenda that determines the allocation of resources to schools. This process involves discussions with school administrators, as well as the utilisation of data and research to develop effective interventions. During an interview with Anita Duineveld, it was explained that not only does the GKA reach out to municipalities, but municipalities also approach the GKA directly to become part of the network (personal communication, June 09, 2023). Sometimes, schools themselves initiate contact with the GKA, which subsequently prompts the GKA to engage with the municipality to establish an agenda. The reason behind the GKA's partnership with municipalities instead of direct engagement with schools is based on the recognition that educational inequality arises not solely from within the school system but is also impacted by external factors such as families and communities. Given that municipalities possess greater influence and authority over these external factors compared to schools, collaborating with them enables a more comprehensive approach to addressing and mitigating educational disparities.

The GKA is making a significant impact by actively taking the initiative to develop new ways of working, collaborations, and communication methods that schools and municipalities are currently in dire need of (Voortgangsrapportage 2022 - GKA, 2023). By providing knowledge, data, communication, and resources, the GKA strengthens promising innovative initiatives and helps them evolve. Moreover, the GKA accelerates these promising initiatives by adopting them within its network and facilitates their scaling up with the preservation of quality, either through resources or substantive collaboration. The GKA also connects promising initiatives with schools in its network, creating potential interest among them. It is important to note that participation is always voluntary and based on the needs of the involved parties. Through its proactive approach, the GKA is bringing about positive changes and fostering a supportive environment for educational development and progress.

III.   Methodology

This research utilises a quantitative exploration analysis to fulfil its objectives, requiring two distinct datasets. The first dataset provides an overview of all municipalities and their participation in the SO, VZ, and GKA programmes, offering crucial information about the municipalities involved in the study programmes. The second dataset encompasses comprehensive statistics for each municipality, including various relevant variables and indicators that capture program-related characteristics. To facilitate analysis, these two datasets are merged into a single, unified dataset, enabling a comprehensive examination of the relationship between programme participation and municipal-level statistics. This study seeks to cast light on the participation of Dutch municipalities in the three initiatives by employing a correlation analysis of various municipal statistics. To achieve this, a variety of codes were developed and utilised for the data analysis. To ensure transparency and reproducibility, all codes employed in this research can be made available upon request.

Data scope

This study's data analysis centres on a particular time span, from 2016 to the year of 2021. The starting point in 2016 corresponds to the initiation of the GKA, which serves as the earliest introduced programme under consideration. By encompassing the entire duration from its inception, it is possible to assess the program's performance throughout its early stages up until its current status. This holistic perspective enables a complete comprehension of the program's evolution and its long-term implications. The selection of a five-year time frame also accommodates the possibility of lacking data. By extending the duration of the analysis, the possibility of exclusively relying on insufficient data is reduced. In addition, data from the most recent years, specifically 2022 and 2023, is entirely excluded because it has not been published in the complete form. Due to these two precautions, this timeframe ensures that the analysis is based on a robust and exhaustive dataset, thereby minimising any potential biases that could result from incomplete or limited data.

With regard to the scope of the municipalities, it is important to note that the composition of municipalities in the Netherlands endures frequent reconstructions through mergers, resulting in the formation of new municipalities and the dissolution of existing ones. In 2016, there were 390 municipalities; by 2021, there were only 352 (Centraal Bureau voor de Statistiek, 2016 & 2021). To address this issue, the analysis is restricted to municipalities that existed throughout the entire time period. This implies that only municipalities present in each year from 2016 to 2021 are included in the study. Consequently, the resultant list of municipalities includes 338 entities.

Municipal inequality of opportunity programmes

The official websites of the three programmes provide a comprehensive list of participating municipalities. To efficiently extract this information from each webpage, a web scraper utilising the programming language Python library Selenium was employed. Subsequently, the extracted data was filtered to include only the municipalities relevant to the study. For detailed information about the resulting dataset, including variable definitions and data sources, refer to Table A1 in Appendix A. The table presents a clear layout of the dataset, offering insights into the collected information.

Statistics of municipalities

For the exploratory analysis, seven major opportunity inequality categories are investigated. Each category contains multiple measures that could serve as a direct indicator for municipalities to act and join a particular programme to address the issue. In contrast, these statistics may suggest an indirect link between municipal inequality of opportunity and programme participation. The following example illustrates the distinction between direct and indirect association with the programmes. If the decision-makers of a particular municipality observe an extremely high educational disadvantage score, they might decide to develop an action plan in collaboration with the GKA to combat it. However, it is possible that in municipalities with a high population density, inequality of opportunity is generally lower than in municipalities with a low population density, resulting in higher participation rates in the low population density municipalities which implies an indirect association. The seven categories along with relevant variables are discussed in the following section.

a. Economics

When studying inequality of opportunity, economic factors play a vital role. Within the economics category, several variables are considered to examine the economic disparities that can either limit or enhance opportunities. These variables include *welfare families*, *economic wellbeing*, *poverty rate*, *unemployment rate*, and *municipal levies*. *Welfare families* help us understand the extent to which children from economically disadvantaged backgrounds face barriers to accessing opportunities. *Economic wellbeing* provides insights into the distribution of wealth and its implications for individuals' ability to pursue opportunities. The *poverty rate* offers an understanding of the prevalence of poverty, which can restrict access to education, healthcare, and other essential resources. The *unemployment rate* indicates the availability of employment opportunities, which significantly impacts individuals' access to income and socioeconomic mobility. Lastly, *municipal levies* shed light on the financial burden placed on individuals and households, influencing their ability to invest in education, healthcare, and other avenues for opportunity.

b. Education

Education plays a crucial role in addressing inequality of opportunity. Within the education category, variables such as *educational disadvantage score* and *school dropout rate* are considered to assess disparities in access to quality education. The *educational disadvantage score* helps identify groups facing educational disadvantages, providing insights into the barriers they encounter. The *school dropout rate* reveals the extent to which students from different backgrounds may face challenges that hinder their educational attainment and future opportunities.

c. Health

Health-related factors have a significant impact on individuals' opportunities in various aspects of life. Within the health category, the variables *life expectancy*, *sport participation*, *smoking habits*, *alcohol consumption*, *vaccination rate*, *psychological health*, and *physical health* are included to investigate disparities in health outcomes and their influence on opportunity. Differences in *life expectancy* can reflect inequalities in access to healthcare, socioeconomic conditions, and lifestyle factors that impact individuals' well-being and opportunities. The other health variables provide insights into behaviours, mental health, and self-perceived physical health, which can influence individuals' engagement in education, employment, and other opportunities.

d. Safety

Safety is an essential aspect of opportunity. Within the safety category, the considered variables are *youth crime rate*, *child abuse rate*, and overall *crime rate* to assess the disparities in safety experienced by different segments of the population. These variables highlight the extent to which certain groups, such as young individuals and children, may face increased risks and barriers to pursuing opportunities due to safety concerns.

e. Demographics

Demographic factors, such as *population density*, *age dependency ratio*, *elderly-youth ratio*, and *ethnic diversity index*, can contribute to the distribution of opportunities in society. These variables provide insights into the structural characteristics of the population that may influence inequality of opportunity. They reflect differences in population composition, age structures, and ethnic diversity, which can impact individuals' access to resources and opportunities.

f. Development

The development category includes variables that provide insights into the spatial aspects and accessibility of resources and amenities. Variables such as the *accessibility index* and *neighbourhood density* help us understand the distribution of services and opportunities within different regions. The *accessibility index* measures the proximity of residents to amenities and transportation facilities,

indicating potential disparities in access to essential services and opportunities. The *neighbourhood density* variable reflects the concentration of human activities in specific areas, highlighting potential variations in access to amenities and opportunities.

g. Politics

Political factors can also contribute to the distribution of opportunities in society. Variables such as *voter turnout rate and political party preference* examine the participation and representation of different groups in the political process, which can have implications for the distribution of opportunities and the ability to influence policy decisions.

Most of the variables can be directly obtained from the data source, except for the *ethnic diversity index, age dependency ratio, elderly-youth ratio,* and *accessibility index* (refer to Appendix B). Moreover, to ensure comparability across municipalities, all variables need to be standardized. While the data source provides a standardized version for most variables, the following variables had to be manually standardized per 10,000 inhabitants: *crime rate, youth crime rate, involvement divorce, child abuse rate,* and *educational disadvantage score* (refer to Appendix B).

Collectively, these variables offer a comprehensive analysis of various aspects that contribute to participation in programmes aimed at combating inequality of opportunity. They provide a more nuanced understanding of the factors influencing individuals' access to resources and life chances. All the required data for the municipalities included in the study was collected for the period from 2016 to 2021. The data was obtained from two different sources, primarily through the OData 4 API of Statistics Netherlands using the Python programming language. It should be noted that the educational disadvantage score cannot be retrieved from the CBS database and needs to be downloaded from the annual report on educational disadvantage scores. The political data is sourced from the election results database of Kiesraad. For detailed information regarding all the variables, including definitions and data sources, please refer to the data guide provided in Table A2 of Appendix A.

Data preparation

In addition to analysing the absolute statistics, it is also important to consider trends in relation to participation in programmes aimed at addressing inequality of opportunity. For instance, even if a municipality has a relatively low child abuse rate, a significant increase in this statistic over a short period may raise concerns and prompt decision-makers to act. To capture both aspects, both absolute and relative measures are examined.

The available data spans a 5-year period, but it contains missing values that should not impact the calculation of both the absolute and relative measures. The absolute measure is constructed by calculating the average over the entire five-year time frame, excluding any missing values. This means that if only three years of data are available for a particular variable in a municipality, the three-year average is computed. Please see the equation below:

$$absolute\ measure = \frac{1}{n} * \sum v$$

<div align="right">(1)</div>

Where v all available values and n number of values available, i.e., number of years available.

On the other hand, the relative measure is computed by calculating the annualized ratio of the last available year over the first available year. The formula is as follows:

$$relative\ measure = \left(\frac{v_{last}}{v_{first}}\right)^{1/n} - 1$$

<div align="right">(2)</div>

Where v_{last} the last available value, v_{first} the first available value, and n the year v_{last} of minus the year of v_{first}, i.e., number of years available.

The chosen method is considered the most appropriate due to the lack of precise information regarding the year when a municipality joined the programme. As a result, it is not feasible to select a year before or after participation for analysis. Opting for the latest year may already include the programme's influence while selecting earlier years would result in incomplete data due to a higher likelihood of missing values. This method effectively addresses the issue of missing values and ensures a robust analysis of both the absolute and relative measures.

In cases where no data is available for a particular variable, it is considered a missing value for the absolute measure. Similarly, if there is no or only one data point available for the relative measure, it is treated as a missing value as well. In such instances, the municipality is excluded from the correlation analysis pertaining to the respective variable.

It is crucial to note that the transformations mentioned above solely apply to continuous variables. Fortunately, in the datasets used for this study, all variables, except for the *political party preference*, are continuous. To calculate the correlation involving *political party preference*, an alternative method must be employed. The specifics of this approach are comprehensively explained in the analysis method section, providing detailed instructions on how to handle this particular variable.

Finally, the combination of the two datasets results in a consolidated dataset consisting of 338 rows. Each row corresponds to a municipality and includes information regarding its participation in programmes, as well as the absolute and relative values of each variable. This merged dataset allows for a comprehensive analysis of the relationship between participation in programmes and the various factors represented by the variables.

Correlation measures

Given the diverse range of data types encompassed in this study, it is necessary to employ various correlation methods tailored to each specific scenario. To establish correlations between binary and categorical variables, as well as between two binary variables, the Φk correlation is utilised. This method effectively captures the associations between these types of variables. Conversely, when examining the relationship between binary and continuous variables, the point biserial correlation is the most appropriate technique to employ. By employing these distinct correlation methods, we can ensure accurate and meaningful analyses across the different data types involved in the study.

Phi correlation, specifically the Φk correlation coefficient, is a newer measure developed by Baak, Koopman, Snoek, and Klous (2020). It provides a comprehensive approach to capturing associations between categorical, ordinal, and interval variables, accounting for both linear and non-linear dependencies. The 'phik' library in Python can be utilised to compute the Φk correlation coefficient.

It captures both linear and non-linear dependencies and reverts to Pearson's correlation coefficient when the bivariate normal input distribution is present. The dataset in this study meets the requirements for the Φk correlation, making it an appropriate choice. The advantages of Φk include its consistency across different variable types, its ability to capture non-linear dependencies, and its usefulness when examining correlation matrices with mixed-type variables. However, the calculation of Φk can be computationally expensive due to integration calculations, and there is no closed-form formula available for direct computation. Additionally, its biggest limitation is that it is unable to indicate the direction of the correlation, meaning its values range from 0 to 1. Despite these limitations, the Φk correlation has been successfully applied in various fields and is suitable for the purpose of this study. Point biserial correlation, introduced by Tate (1954), is a correlation coefficient used to measure the association between a continuous variable and a dichotomous variable. It is a special case of Pearson's correlation coefficient and has a range from -1 to +1. The calculation of the point biserial correlation

can be carried out using statistical libraries such as the 'scipy' library in Python. To apply the point biserial correlation, it is assumed that the continuous variable follows a normal distribution and exhibits homoscedasticity. In this study, the dataset satisfies these assumptions, making the point biserial correlation a suitable choice. The strength of the point biserial correlation lies in its intuitive nature, as it closely resembles the widely used Pearson correlation coefficient. Additionally, it is computationally efficient to calculate. However, it is important to note that the point biserial correlation assumes linearity between the variables and may not capture nonlinear relationships accurately. These assumptions and limitations should be considered when interpreting the results.

Given that the study utilises data for all municipalities in the Netherlands rather than a sample, the calculation of statistical significance is not relevant in this context. Statistical significance testing is typically employed when drawing inferences about a population based on a sample. However, when the entire population is studied, the focus shifts to accurately describing and understanding the relationship between variables within the population. In such cases, the correlation coefficient calculated from the population data represents the true population correlation, eliminating the need for hypothesis testing.

Analysis method
The analysis of this research entails three parts, the exploration of participation rates, the correlation analysis, and the weighted least squares regression. In the exploration of participation rates part, the study delves into the number of municipalities participating in the three programmes as well as the number of implemented programmes by each municipality.

The correlation analysis is divided into eight subsections, seven addressing the specific variable categories Economics, Education, Health, Safety, Demographics, Development, and Politics. Within these seven sections, we examine the correlation between the variables within each category and the participation in three programmes: SO, VZ, and GKA. The eighth subsection focuses on exploring correlations between programme participation itself. This entails investigating whether an association exists between participating in one programme and participating in another. As both variables are dichotomous, the Φk correlation matrix for this analysis is utilised.

For each category, correlation matrices for each programme are constructed, resulting in a total of three matrices per category. In the Politics category, alongside the *voter turnout rate*, there exists a categorical variable representing *political party preference*. Therefore, a different approach is adopted. The analysis of political party preference involves three distinct parts. Firstly, the calculation of the Φk correlation between the categorical variable of *political party preference* and the binary variables indicating programme participation. Secondly, the employment of the point biserial correlation to examine the relationship between *political party preference change* (binary variable indicating a change between

two elections within the specified time period) and the programme participation binary variables. Lastly, an in-depth analysis of the preference for a specific political party and its association with participation in the three programmes is conducted.

At last, three weighted least squares regressions are performed, where the dependent variable is programme participation and the independent variables are the continuous absolute municipal characteristics. To address the issue of missing values, the approach employed involves calculating the median value for the specific characteristic across all municipalities. Subsequently, the models are employed to determine the predicted probability of participation for each municipality across the three programmes.

IV.   Results

This section provides a presentation and interpretation of the results obtained from the correlation analysis, as outlined in the methodology section. Initially, a summary of the involvement of Dutch municipalities in three particular programmes (SO, VZ, and GKA) is given in order to establish a comprehensive framework for the subsequent analysis. Subsequently, the investigation centres around eight correlation subsections that aim to explore the factors linked to programme participation. This comprehensive exploration seeks to uncover valuable insights into the factors that influence municipalities' engagement in these programmes. Lastly, weighted least squares regressions were conducted for each programme to discern which municipalities, based on their statistics, are expected to participate but currently do not.

Exploration participation rates

Figure 1 illustrates the participation of multiple municipalities in each programme It is worth noting that the GKA has the fewest participants despite being the programme that has been recognised the earliest and therefore has been in existence the longest. On the other hand, the SO programme, which is relatively new, has nearly double the number of participants. However, it is important to consider that the dataset encompasses a total of 338 municipalities, thus the participation rates for all three programmes are relatively low.
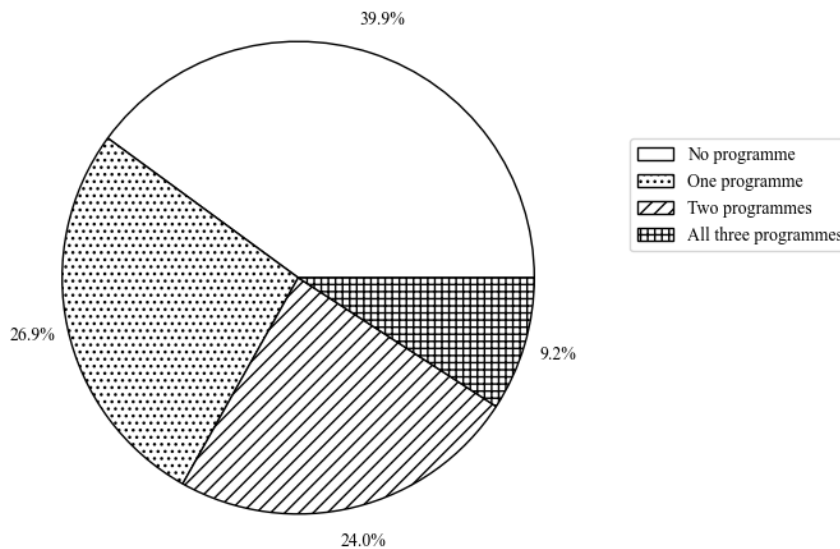
Figure 1. Bar chart of the number of municipalities per programme
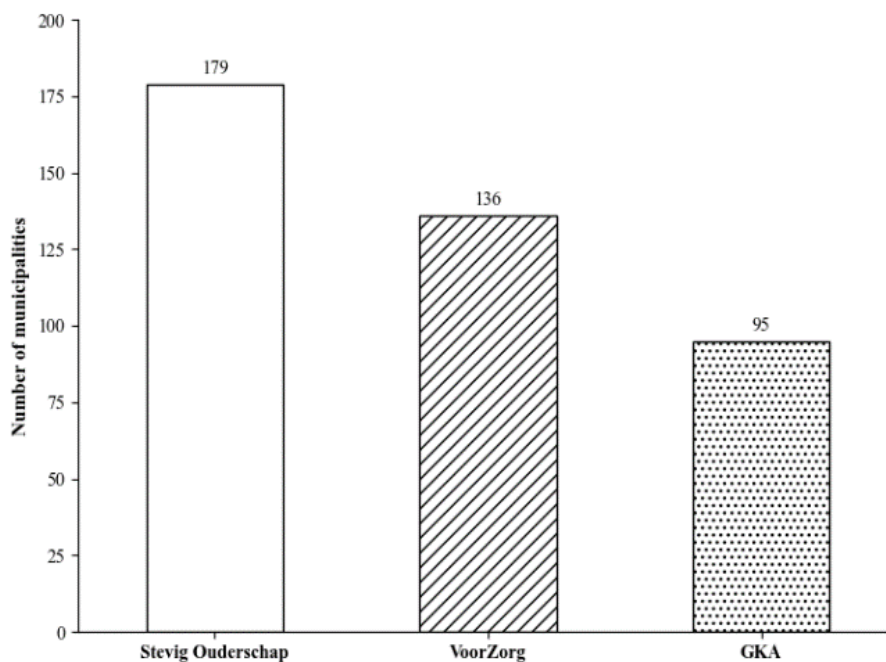
Note. The bar chart represents the distribution of the number of municipalities participating in each programme.

Figure 2 provides an additional visual representation of this pattern, demonstrating that approximately 40% of municipalities have not implemented any programme. However, a larger percentage of municipalities that have implemented at least one programme have chosen to implement two or all three of the programmes simultaneously.

Figure 2. Pie chart of the proportion of municipalities categorised by the number of programmes implemented

Note. The pie chart illustrates the distribution of municipalities based on the number of programmes they have implemented. Specifically, the percentages explain that of the 338 municipalities 81 implement none of the programmes, 135 implement one programme, 91 implement two programmes, and 31 implement all three programmes.

Correlations analysis

a. Economics

The correlation analysis presented in Figure 3 illustrates the point biserial correlations between economic factors and participation in the SO, VZ, and GKA programmes. The results reveal very strong positive relationships between the GKA programme and economic factors, particularly with the absolute poverty rate (0.58), absolute unemployment rate (0.54), absolute welfare families (0.53), and relative economic well-being (0.45). Additionally, there is a very strong negative correlation between absolute economic well-being and the GKA programme. For the SO and VZ programmes, the correlations are slightly weaker, but the directions of the correlations are similar. Both programmes, SO and VZ, also show a positive correlation with the absolute unemployment rate, but the strength is only moderate (0.2 and 0.24, respectively). Similarly, there is a moderate positive relationship between SO and relative economic well-being (0.22), VZ and the absolute poverty rate (0.25), and VZ and the absolute welfare families (0.25). Like the GKA, VZ also has a negative correlation with absolute

economic well-being, but this correlation is also only of moderate strength (-0.26). All other correlations between the three programmes and economic factors are weak to very weak.

Figure 3. Correlation heatmap of programme participation and economic factors

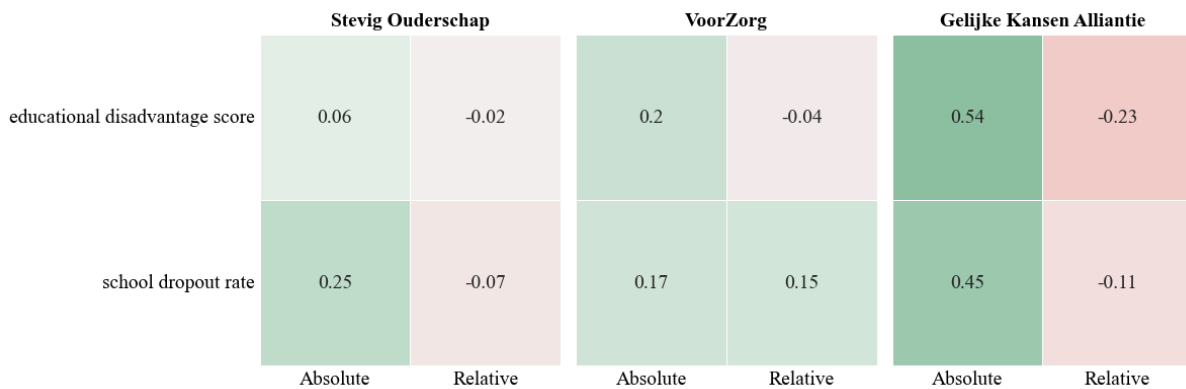|	Stevig Ouderschap		VoorZorg		Gelijke Kansen Alliantie	
economic wellbeing	-0.08	0.22	-0.26	0.19	-0.48	0.45
municipal levies	0.14	0.03	-0.07	-0.01	0.05	-0.08
poverty rate	0.13	0.05	0.25	-0.09	0.58	-0.01
unemployment rate	0.2	0.18	0.24	-0.1	0.54	0.16
welfare families	0.12	0.01	0.25	-0.07	0.53	-0.11
	Absolute	Relative	Absolute	Relative	Absolute	Relative

Note. All values display point biserial correlation.

These findings suggest that municipalities with higher poverty rates, unemployment rates, and a larger percentage of families dependent on welfare are more likely to have implemented these programmes. Simultaneously, a higher median wage within a municipality is associated with a lower likelihood of participation in the GKA programme. Interestingly, the result regarding relative economic well-being implies that an increasing median wage is associated with a higher likelihood of a municipality implementing these programmes. However, it is important to note that these correlations are significantly stronger for the GKA programme compared to SO and VZ.

b. Education

The analysis of educational factors in Figure 4 provides significant insights into the patterns of participation in the SO, VZ, and GKA programmes. Participation in the GKA programme exhibits a very strong positive correlation with the absolute educational disadvantage score and absolute school dropout rate (0.54 and 0.45, respectively). These correlations are also observed for the VZ programme, but they are of moderate strength, with a correlation value of 0.2. Similarly, the correlations also exist for the SO programme, but they are slightly weaker, with a correlation value of 0.25, also considered moderate. Additionally, there is a negative and moderate association between the GKA programme and the relative educational disadvantage score (-0.23).

Figure 4. Correlation heatmap of programme participation and educational factors

	Stevig Ouderschap		VoorZorg		Gelijke Kansen Alliantie	
	Absolute	Relative	Absolute	Relative	Absolute	Relative
educational disadvantage score	0.06	-0.02	0.2	-0.04	0.54	-0.23
school dropout rate	0.25	-0.07	0.17	0.15	0.45	-0.11

Note. All values display point biserial correlation.

The correlations demonstrate a consistent direction, except for the relative school dropout rates. Once again, the GKA programme shows higher correlations with most educational factors. The results indicate that a higher municipal educational disadvantage score and a higher percentage of school dropouts are associated with programme participation. Interestingly, a decrease in the educational disadvantage score within a municipality moderately increases the likelihood of participation in the GKA programme.

c. Health

The correlation analysis presented in Figure 5 provides insights into the relationship between programme participation and various health-related factors, including alcohol consumption, life expectancy, physical health, psychological health, smoking habits, sports participation, and vaccination rates. Most health-related factors show very weak correlations with the programmes, particularly the relative variables. Despite being weak, the correlations generally exhibit the same direction. Although no very strong correlations exist, the GKA programme demonstrates a strong negative relationship with life expectancy at birth (-0.33). Absolute physical health is moderately and negatively correlated with all three programmes, SO, VZ, and GKA (-0.27, -0.21, and -0.29, respectively).

Furthermore, the analysis reveals a moderate positive correlation between SO and absolute psychological health (0.21), as well as a moderate negative correlation between GKA and the absolute percentage of students who engage in weekly sports (-0.24). This implies that a higher percentage of students with deviating psychological health scores is associated with a higher likelihood of participating in the SO programme. Simultaneously, a higher percentage of students who engage in weekly sports is associated with a lower likelihood of participating in the GKA programme.

Figure 5. Correlation heatmap of programme participation and health-related factors

	Stevig Ouderschap		VoorZorg		Gelijke Kansen Alliantie	
alcohol consumption	-0.09	-0.05	-0.03	-0.01	-0.17	-0.02
life expectancy	-0.02	0.16	-0.16	-0.02	-0.33	-0.04
physical health	-0.27	0.05	-0.21	0.07	-0.29	-0.07
psychological health	0.21	0.12	0.12	-0.05	0.18	0.11
smoking habits	-0.05	-0.09	-0.06	0.03	0.05	-0.13
sport weekly	0.06	0.12	-0.08	-0.01	-0.24	0
vaccination rate	0.07	-0.02	0.01	0.01	-0.03	-0.14
	Absolute	Relative	Absolute	Relative	Absolute	Relative

Note. All values display point biserial correlation.

d. Safety

The correlation analysis presented in Figure 6 examines the relationship between programme participation and safety statistics, including child abuse rates, crime rates, and youth crime rates. The absolute child abuse rate, crime rate, and youth crime rate show (very) strong positive correlations with the GKA programme (0.34, 0.52, and 0.52, respectively). Similarly, these statistics display positive but moderate relationships with the implementation of SO (0.2, 0.21, and 0.2, respectively).

Figure 6. Correlation heatmap of programme participation and safety statistics

	Stevig Ouderschap		VoorZorg		Gelijke Kansen Alliantie	
child abuse rate	0.2	0.14	0.15	-0.15	0.34	-0.12
crime rate	0.21	-0.11	0.1	-0.1	0.52	-0.15
youth crime rate	0.2	0.02	0.11	0.08	0.52	0.06
	Absolute	Relative	Absolute	Relative	Absolute	Relative

Note. All values display point biserial correlation.

The correlation analysis indicates that programme participation, particularly in the GKA and SO programmes, is positively associated with absolute safety statistics. Although the correlations for VZ are weak, they still exhibit the same direction, suggesting that municipalities with higher child abuse rates, crime rates, and youth crime rates are more likely to participate in these programmes. However, the relative changes in these statistics have weak associations with programme participation.

e. Demographics

The correlation analysis presented in Figure 7 investigates the relationship between programme participation and demographic factors. The data reveals a strong and positive correlation between the absolute ethnic diversity index, absolute population density, and the GKA programme, with the former showing a very strong correlation (0.44 and 0.32, respectively). Similar observations are found for the SO programme, with positive and moderate correlation values of 0.24 and 0.27, respectively. However, for the VZ programme, only weak correlations are present. In addition, the GKA programme displays a negative and strong correlation with the absolute age dependency index (-0.36), as well as moderate correlations with the absolute elderly youth ratio (-0.24) and relative ethnic diversity index (-0.28).

Figure 7. Correlation heatmap of programme participation and demographic factors

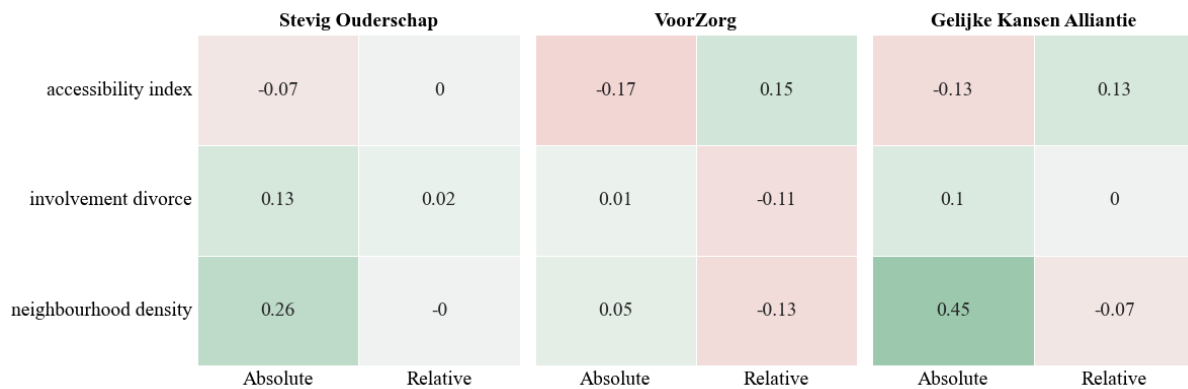|	Stevig Ouderschap		VoorZorg		Gelijke Kansen Alliantie	
age dependency ratio	-0.07	-0.07	0.02	0.15	-0.36	-0.15
elderly youth ratio	-0.05	-0.09	0.19	0.08	-0.24	0.14
ethnic diversity index	0.24	0.03	0.05	-0.18	0.44	-0.28
population density	0.27	-0.04	0.03	-0.08	0.32	-0.1
	Absolute	Relative	Absolute	Relative	Absolute	Relative

Note. All values display point biserial correlation.

The correlation analysis suggests that only participation in the GKA and SO programmes is related to demographic factors, particularly the absolute ethnic diversity index and absolute population density. This indicates that the likelihood of participation is higher in municipalities with a higher ethnic diversity index and denser population. Additionally, decreasing ethnic diversity, as well as lower age dependency ratios and elderly youth ratios, are associated with participation in the GKA programme.

f. Development

The correlation analysis presented in Figure 8 examines the relationship between programme participation and development indicators, including the accessibility index, children's involvement in divorce, and neighbourhood density. Overall, there is no significant association between the three programmes and the development variables. However, there is a very strong positive correlation between the absolute neighbourhood density and the GKA programme (0.45), as well as a moderate positive relationship between neighbourhood density and the SO programme (0.26). This suggests that municipalities with higher neighbourhood density are more likely to participate in these two programmes. Although all other correlations are weak, the direction of these findings remains consistent across the three programmes.

Figure 8. Correlation heatmap of programme participation and development indicators

	Stevig Ouderschap		VoorZorg		Gelijke Kansen Alliantie	
accessibility index	-0.07	0	-0.17	0.15	-0.13	0.13
involvement divorce	0.13	0.02	0.01	-0.11	0.1	0
neighbourhood density	0.26	-0	0.05	-0.13	0.45	-0.07
	Absolute	Relative	Absolute	Relative	Absolute	Relative

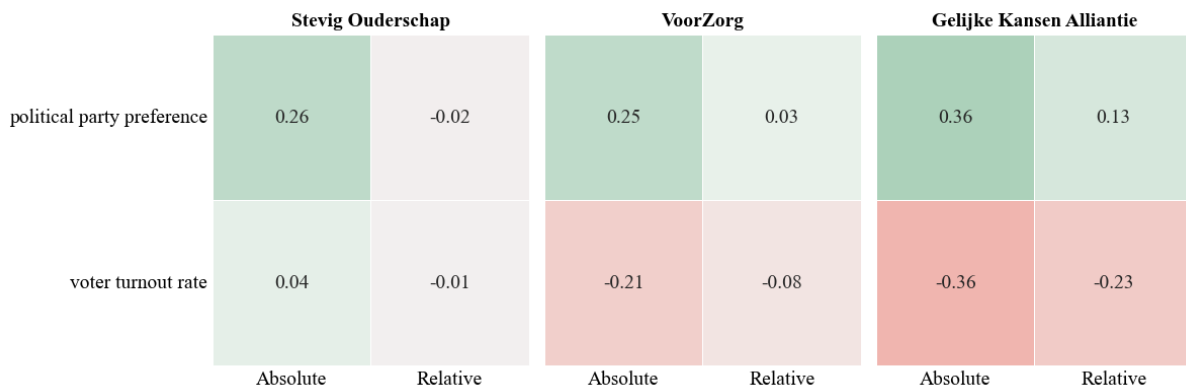*Note.* All values display point biserial correlations.

g. Politics

The correlation analysis presented in Figure 9 explores the relationship between programme participation and election results, specifically political party preference and voter turnout rate. It is important to note that the variable absolute political party preference is computed using the Φk correlation, which does not indicate a specific direction. Therefore, the correlations for this variable reflect the strength of the association but not the direction. There are moderate to strong correlations observed between programme participation and political party preference. SO shows a moderate correlation of 0.26, VZ exhibits a similar correlation of 0.25, and GKA demonstrates a stronger correlation of 0.36 with political party preference. However, when considering changes in political party preference, all three programmes show negligible correlations.

Regarding the voter turnout rate, there are mixed correlations observed between programme participation and voter turnout. The GKA programme displays a strong negative correlation with absolute voter turnout (-0.36) and a moderate negative correlation with the relative statistic (-0.23). Simultaneously, VZ displays a moderate negative correlation with absolute voter turnout of -0.21, while for SO, both correlations are very weak.

These findings suggest that there is a relationship between programme participation and election results, specifically political party preference and voter turnout rate. While there is a positive correlation between participation in the programmes and political party preference, the correlations with voter turnout rate vary between programmes. Specifically, participation in VZ and GKA is associated with a lower voter turnout rate, and GKA participation is also related to a decreasing voter turnout rate.

Figure 9. Correlation heatmap of programme participation and election results

	Stevig Ouderschap		VoorZorg		Gelijke Kansen Alliantie	
	Absolute	Relative	Absolute	Relative	Absolute	Relative
political party preference	0.26	-0.02	0.25	0.03	0.36	0.13
voter turnout rate	0.04	-0.01	-0.21	-0.08	-0.36	-0.23

Note. The variable absolute political party preference is computed using Φk correlation which does not indicate a direction. The remaining values display the point biserial correlation.

The findings suggest a notable correlation between municipal political party preferences and their involvement in the SO, VZ, and GKA programmes. To further explore this observation, the participation rates of winning political parties in various municipalities are examined in Figure 10. The figure illustrates the percentage of municipalities where each political party emerged as the top contender in the Dutch second chamber elections from 2016 to 2021, covering the 2017 and 2021 elections.

It's important to approach the interpretation of Figure 10 with caution due to the fact that it does not display the actual number of municipalities won by each party. Consequently, extreme proportions can be observed, such as in the case of GROENLINKS, which ranked first in three municipalities, all of which participated in VZ and GKA, resulting in a 100% participation rate. Nonetheless, the data presented in the figure provides valuable insights into potential patterns.

Figure 10 reveals mixed results regarding the progressive nature of political parties. The highly conservative party PVV demonstrates high participation rates, while the highly progressive party D66 also shows very high participation rates. In contrast, the relatively neutral parties in terms of progressivity, namely CDA and VVD, exhibit significantly lower participation rates. In terms of their positioning on the political spectrum, the relatively neutral parties D66, CDA, and PVV display relatively higher participation rates.

Figure 10. Panel of bar charts for the participation rate in each programme within the municipalities where the respective political party won, in the second chamber election of 2017 and 2021
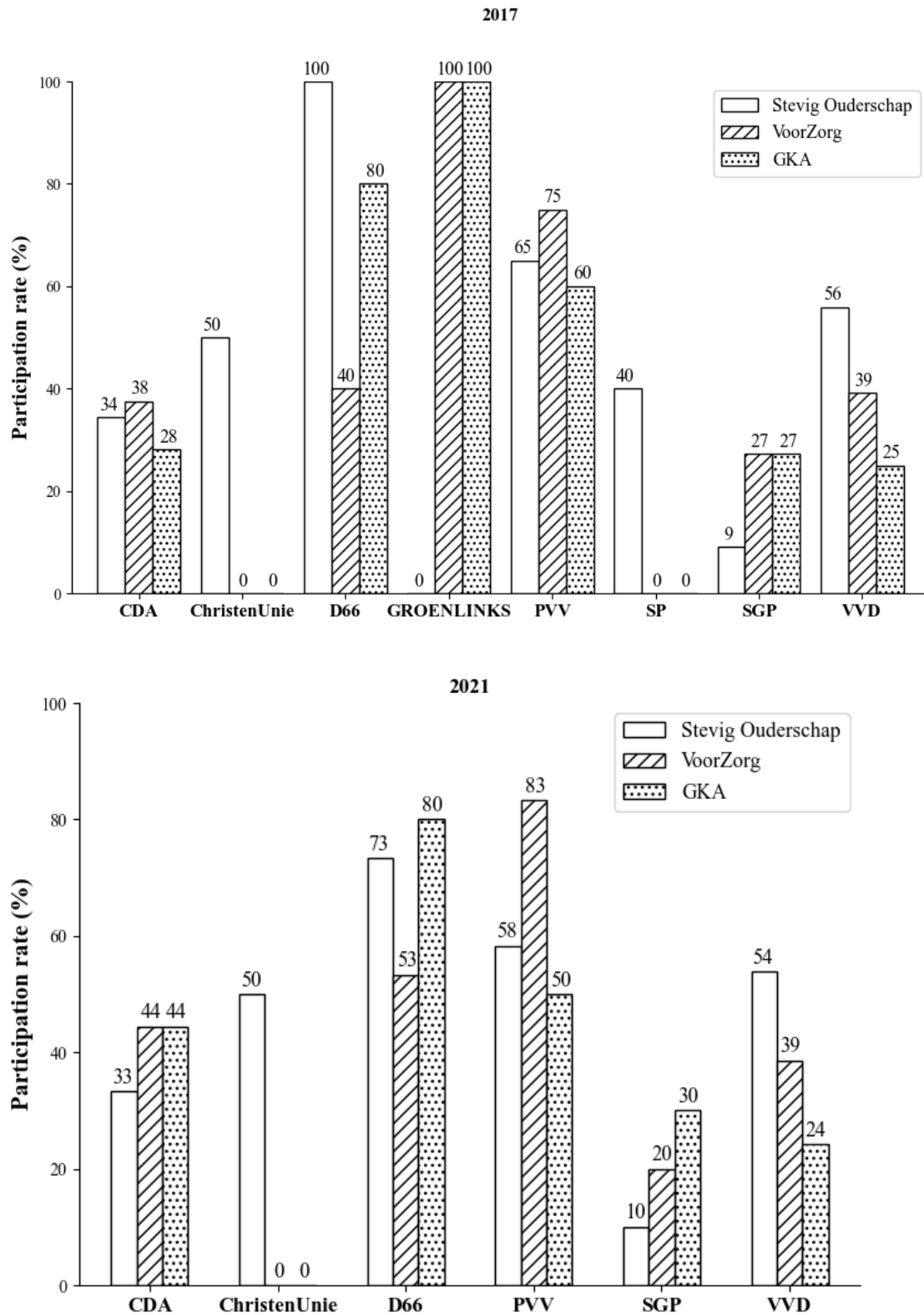
Note. The figures present the participation rates in each program within the municipalities where the respective political parties emerged victorious in the second chamber election of 2017 and 2021.

h. Programme interconnectedness

Figure 11 provides valuable insights into the interconnections and relationships among the different programmes by shedding light on the varying degrees of correlation between their participation rates. The visualization indicates that there is no correlation between participation in SO and VZ, as indicated by a correlation coefficient of 0. On the other hand, participation in the GKA programme shows a weak correlation with SO and a strong correlation with VZ, with correlation coefficients of 0.07 and 0.31, respectively. This suggests that there is a limited association between participation in SO and VZ, while a stronger relationship exists between participation in GKA and VZ.

Figure 11. Correlation heatmap of participation in different programmes
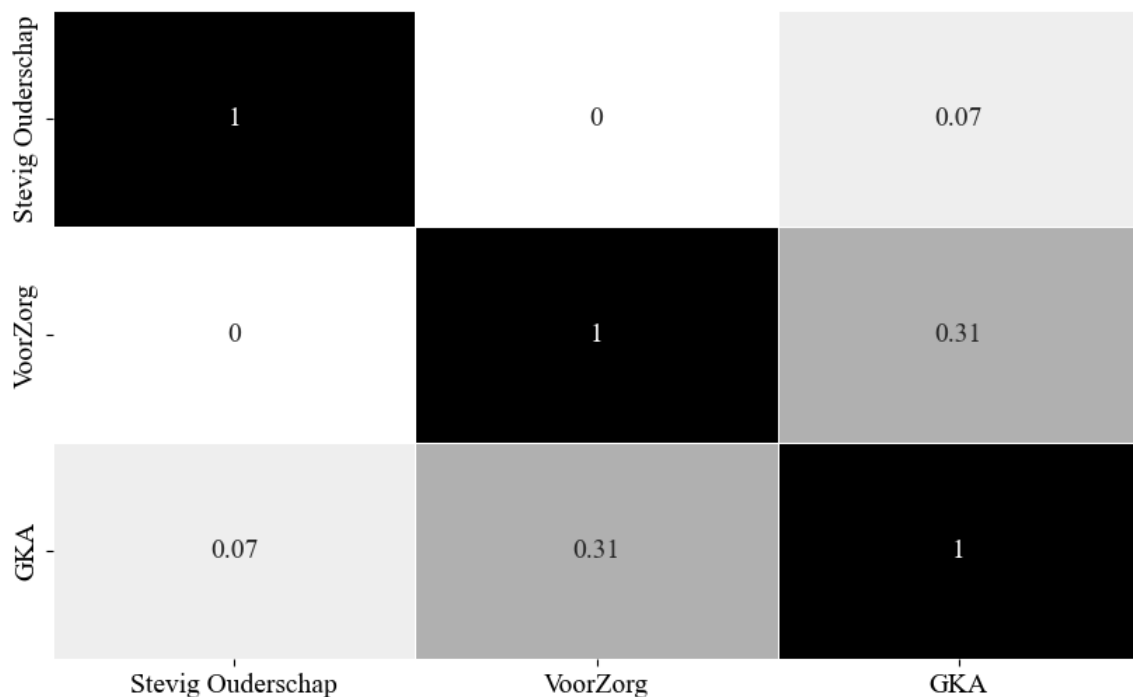
Note. All values display Φk correlation which does not indicate a direction.

Weighted least squares regressions

The complete models were developed using the weighted least squares regression method to capture the relationship between various municipal variables and the probability of programme participation. Each of the aforementioned regression analyses accounts for the absolute, continuous municipal characteristics. Table C1 in Appendix C contains the complete specifications of these models, including coefficients, standard errors, and other pertinent information.

These models are used to predict the likelihood of participation in each programme across all municipalities. Table 2 provides an overview of the municipalities that, despite their current non-participation, are projected to join each of the three programmes with a high likelihood. By

implementing a 0.8 criterion, the municipalities whose participation probability falls below this level are excluded. The listed municipalities are subsequently presented in decreasing order based on their anticipated probability of participation. For instance, Roosendaal is predicted to have the highest likelihood of adopting the SO programme, while Schiermonnikoog has the highest likelihood of adopting VZ and Zeewolde ranks first for the adoption of GKA.

Table 2. Municipalities with highest predicted probability of participation in each programme

Rank	Stevig Ouderschap	VoorZorg	GKA
1	Roosendaal	Schiermonnikoog	Zeewolde
2	Scherpenzeel	Cuijk	Vlieland
3	Landsmeer	Veendam	/
4	Papendrecht	Vlieland	/
5	Albrandswaard	Gilze en Rijen	/
6	Gilze en Rijen	Kaag en Braassem	/
7	Zutphen	Brummen	/
8	/	Boxmeer	/
9	/	Velsen	/
10	/	Uitgeest	/

Note. This table lists non-participating municipalities predicted to have a probability exceeding 0.8 of joining each programme. They are ranked based on their predicted likelihood of participation, from highest to lowest.

V.   Discussion and conclusion

The discussion section of this study delves into the interpretation of the results obtained and discusses their implications. It provides a thorough discussion of any limitations in the research approach. Furthermore, this section offers valuable suggestions for future research endeavours, aiming to expand upon the present study. Ultimately, a conclusion is drawn concerning the research question. By critically evaluating the results and considering potential avenues for further investigation, this section adds depth and context to the study's outcomes.

Discussion of results

The results of the correlation analysis provide valuable insights into the factors associated with the participation of Dutch municipalities in three specific programmes: SO, VZ, and GKA. The analysis explored the participation rates, various factors grouped into different categories, and the interconnectedness of the programmes.

The results regarding programme participation rates reveal intriguing findings. Surprisingly, the GKA programme, despite being the longest-running, exhibits the lowest number of participants. However, it is crucial to note that the overall participation numbers for all three programmes remain relatively low, with no programme. These findings raise questions about the factors influencing programme engagement and highlight the need for further investigation. In the interview with Anita Duineveld, she argues that the focus is on improving the current programmes at the place where it is needed most before expanding the network further (personal communication, June 09, 2023). This perspective suggests a prioritization of enhancing existing interventions rather than introducing new ones. Furthermore, according to van der Horst (2023), the relatively low participation rates may be attributed to the newness of the programmes and the lack of sufficient awareness surrounding them. Interestingly, among the municipalities that have implemented at least one programme, a significant number have gone on to implement second or third programmes. This observation hints at a potentially high level of satisfaction and effectiveness among these municipalities, indicating a desire to further benefit from these initiatives.

The analysis highlights the alignment between the correlation domains and the target groups of the SO, VZ, and GKA programmes. The correlations indicate that the SO and VZ programmes, which focus on the early stages of child development, are more associated with factors such as economic conditions, education, and health. This is in line with their target groups, which include parents during pregnancy and the early years of a child's life. The strong correlations with economic factors, such as the poverty rate, unemployment rate, and children living in welfare households, indicate that these programmes aim to address the challenges faced by families in disadvantaged socioeconomic circumstances. Similarly,

the associations with education- and health-related factors reflect the programmes' emphasis on improving educational outcomes and overall health for children in vulnerable families during the crucial early stages of development.

On the other hand, the GKA programme specifically targets youth in disadvantaged neighbourhoods and demonstrates stronger associations with factors related to the environment of the child during the later stages of their life. This includes domains such as economic conditions, education, and safety. The program's emphasis on these factors aligns with its target group of older children and adolescents who face unique challenges in disadvantaged communities. The correlations between programme participation and educational factors further underscore the GKA's commitment to addressing the educational challenges faced by these youth. By targeting educational disparities, the GKA aims to provide opportunities for academic success, promote educational attainment, and equip young individuals with the skills and resources necessary to overcome the barriers they encounter.

Overall, the absolute correlations between the variables and the programmes were consistently stronger compared to the relative correlations. Additionally, all three programmes analysed exhibited consistent associations in the same direction with the examined variables. Although the absolute correlations are significantly greater compared to the relative correlations and all three programmes exhibit a consistent general direction of associations with the analysed variables, GKA consistently shows significantly stronger correlations.

The analysis of interconnectedness between programme participation provides additional insights into the relationships between VZ, SO, and GKA programmes. Interestingly, while there is no significant correlation between programme participation in VZ and SO, both programmes exhibit a significant correlation with GKA. One possible explanation for this finding is that children of which the mother faces challenges in providing a safe upbringing may later encounter difficulties in their educational pursuits. The existing research of Zumbuehl & Dillingh (2020) supports this notion. Consequently, municipalities may implement VZ and SO programmes to address the immediate concerns of child's development, while simultaneously GKA aims to tackle the educational disparities arising from hampered development.

Limitations and suggestions

The present study is subject to several limitations that should be considered when interpreting the findings. One of the main limitations of the research lies in the complexity associated with the VZ and SO programmes, as Dr. Merian Bouwmeester explains the involvement of numerous qualitative factors. This complexity adds a layer of intricacy to the analysis and interpretation of the data (personal communication, June 09, 2023). One of these factors is the level of trust that municipalities place in the

data provided by the Central Bureau of Statistics (CBS). There may be instances where municipalities have reservations or doubts regarding the accuracy or relevance of the data, which can impact the decision-making process. Furthermore, municipalities receive advice from various types of advisors, some of whom prioritize the recommendations of the JGZ-organisations, while others view it as merely advisory. This variation in perspectives and reliance on different sources of advice introduces subjectivity into the decision-making process. Additionally, the unique characteristics and backgrounds of each policy leader play a significant role in the decision-making process. Their diverse experiences and perspectives can result in variations in programme implementation and outcomes. Furthermore, larger municipalities tend to encounter more problems and allocate a larger budget to address them. Conversely, smaller municipalities may collaborate geographically, rather than based solely on statistical considerations, to participate in the programme. Moreover, factors such as the presence of an asylum centre within a municipality can severely influence the statistics. These diverse factors and circumstances contribute to the complexity and limitations of the research.

Concerning the data, the lack of specific information on the year each municipality joined the programme poses challenges. If a municipality joined in the early years, the program's statistics may have already influenced the municipality's data, while analysing only the years around the program's introduction would result in a small dataset with limited municipalities. Additionally, missing data in certain variables adds complexity, although the methodology used employs a single value absolute and relative measure to mitigate this issue and enhance the robustness of the analysis. Another limitation is the relatively small time period covered by the data, which hinders the extension of the analysis due to data unavailability. Moreover, changes in the measurement of variables, such as psychological health, over time can introduce potential biases and impact the accuracy of the results. Lastly, the aggregated nature of the data at the municipal level limits the granularity of the analysis. Privacy concerns restrict access to more detailed, lower-level data, thereby posing challenges in capturing local variations. For example, in the conversation with Anita Duineveld, it was explained that certain areas or schools in municipalities like Amsterdam may experience inequality of opportunity, leading to collaboration with GKA (personal communication, June 09, 2023). However, when aggregated, the presence of other schools in Amsterdam that do not face the same issue could mask the statistics, potentially distorting the aggregated data and its interpretation.

Regarding the approach employed, it is important to note that the analysis establishes associations rather than causality. Causality could be explored if the exact year of programme participation for each municipality was known. However, the heterogeneity across municipalities prevents the assumption of homogeneity required for classic econometric models. This assumption fails to hold as the municipalities cannot be assumed to be the same. Nevertheless, machine learning methods offer a potential avenue for addressing this issue by accommodating heterogeneity in causal inference models,

as discussed by Künzel et al. (2019). This approach remains a subject of debate, as demonstrated in the interview between Guido Imbens and John Angrist (Marginal Revolution University, 2022), but it holds promise for shedding light on inequality of opportunity in the Netherlands and advancing the field of machine learning in economics.

Conclusion

This study employed a quantitative approach to investigate the determinants of participation in programmes aimed at addressing inequality of opportunity among municipalities in the Netherlands, as well as the differences across these programmes. The correlation analysis conducted in this study revealed that different programmes have varying degrees of association with specific factors. This disparity in correlations can be attributed to the extent to which these factors are associated with the target population of each programme. Furthermore, certain programmes exhibited stronger correlations than others, primarily due to their reliance on a more quantitative approach to decision-making.

It is noteworthy that no significant correlation was found between programme participation in VZ and SO. However, both programmes exhibited a meaningful correlation with the GKA programme. This suggests a potential association between municipalities facing educational inequality issues and the target groups of SO and VZ.

The insights gained from interviews provide an opportunity to compare the hypothesized associations between programme participation and specific variables with the obtained results. The analysis partially supported the initial hypotheses regarding the SO and VZ programmes. It was expected that statistical data related to the early stages of a child's life, such as life expectancy and instances of child abuse, would exhibit strong correlations with programme participation. However, while the correlations with these specific variables stand out among others, their strength is only moderate.

Regarding the GKA programme, the hypothesis that participation would primarily be associated with socio-economic and educational variables was confirmed. Strong associations were indeed found between GKA participation and variables related to poverty, unemployment, families on welfare, economic well-being, educational disadvantage, dropout rates, and ethnic diversity. Furthermore, participation in the GKA programme showed significant associations with safety statistics of municipalities, such as crime and child abuse rates. These findings strongly support the notion that the GKA programme aims to address inequality of opportunity in areas with higher levels of socio-economic and educational challenges. By targeting municipalities with higher levels of poverty, unemployment, and educational disadvantage, as well as safety concerns, the GKA programme aims to provide support and resources to address the specific needs of these communities and promote equal opportunities for children and youth.

In conclusion, while the results aligned with the initial hypotheses regarding the programmes, it is important to acknowledge the limitations of this study. The quantitative approach employed in this study has several challenges, including the lack of specific information on programme initiation dates, missing data, and the relatively small time period available for analysis. Additionally, the complexity of the analysed programmes and the subjective decision-making processes within municipalities further contribute to these limitations. Inequality of opportunity is a multifaceted issue in the Netherlands, encompassing both quantitative and qualitative aspects. Despite these constraints, the findings of this study contribute to the understanding of the factors associated with programme participation and the complex dynamics of addressing inequality of opportunity in the Netherlands. However, further research that resolves the data issues or employs alternative methods is necessary to fully confirm the associations between programme participation and the specific variables investigated.

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Appendices

Appendix A: Data guides

Table A1. Data guide: Municipal inequality of opportunity programmes

Variable Name	Description	Source
municipality	Municipality names, only includes municipalities that existed over the entire period of 2016-2021	CBS, 2016 & 2021
id	Municipality code, in format GMXXXX	CBS, 2016 & 2021
SO	Binary variable indicating whether the municipality implemented the SO programme	Stevig Ouderschap - NCJ, 2022
VZ	Binary variable indicating whether the municipality implemented the VZ programme	VoorZorg - NCJ, 2022
GKA	Binary variable indicating whether the municipality is a member of the GKA	Ministerie van Onderwijs, Cultuur en Wetenschap, 2022

Table A2. Data guide: Statistics of municipalities

Variable Name	Category	Description	Source
welfare families	economics	Percentage of children living in welfare families. This percentage is calculated by relating the number of children in welfare families to the total number of children aged 0 to 18.	CBS, 2023k
economic wellbeing	economics	Median wealth of private households (excluding student households). Wealth includes assets and debts.	CBS, 2023l
poverty rate	economics	Percentage of private households with income below the low-income threshold. Low-income households are those with a standardized disposable household income, excluding housing allowance, below the low-income threshold. Duration of income position refers to at least 1 year.	CBS, 2023i
unemployment rate	economics	Percentage of individuals without paid work who have actively sought work and are available for work. This definition applies to individuals residing in the Netherlands aged 15 to 75.	CBS, 2023b
municipal levies	economics	Total municipal levies, including taxes and fees, presented in euro per inhabitant.	CBS, 2023d
educational disadvantage score	education	Educational disadvantage score per student (see Appendix B).	CBS, 2023a
school dropout rate	education	Percentage of early school leavers within the total number of students. The data is based on school years. For example, when referring to the year 2004, it means the school year 2004/2005.	CBS, 2023m
life expectancy	health	The number of years a newborn child is expected to live	CBS, 2023j
sport weekly	health	Percentage of students in the second and fourth year of secondary education who engage in weekly sports activities at clubs, associations, or gyms.	CBS, 2023c & 2023g
smoking habits	health	Percentage of students in the second and fourth year of secondary education who smoke on a weekly basis or more frequently.	CBS, 2023c & 2023g
alcohol consumption	health	Percentage of students in the second and fourth year of secondary education who have been drunk or tipsy in the past 4 weeks.	CBS, 2023c & 2023g
psychological health	health	Percentage of students in the second and fourth year of secondary education who have deviating mental health scores. In 2019 defined by scores indicating "abnormal" Strength and Difficulties Questionnaire (SDQ). In 2021 defined as a score of 60 or less on the Mental Health Inventory 5 (MHI-5).	CBS, 2023c & 2023g
physical health	health	Percentage of students in the second and fourth year of secondary education who rate their health as (very) good.	CBS, 2023c & 2023g

Table A2. Data Guide: Statistics of Municipalities (continued)

vaccination rate	health	Percentage of infants vaccinated against DKTP (diphtheria, whooping cough, tetanus and polio). The vaccination rate is provided for the years 2015 to 2020, representing infants born between 2012 and 2017.	CBS, 2023g
youth crime rate	safety	Number of individuals up to 25 years old suspected of committing a crime as per 10,000 inhabitants. This data includes individuals registered in the Basic Enforcement System (BVH) of the police. If a person is registered more than once within a reporting year, they are counted only once in the total number of suspects.	CBS, 2023k
child abuse rate	safety	Number of reports made to Safe Home (Veilig Thuis) regarding situations or suspicions of child abuse as per 10,000 inhabitants.	CBS, 2023g
crime rate	safety	Total number of reported crimes per 10,000 inhabitants. A crime is an offence that is punishable under criminal law.	CBS, 2023e
involvement divorce	development	Number of minors involved in a divorce as per 10,000 inhabitants. A minor child refers to a person under the age of eighteen.	CBS, 2023h
population density	demographics	Ratio of number of inhabitants per square kilometre of land.	CBS, 2023l
age dependency ratio	demographics	Ratio indicating the number of dependent persons (ager group below and above, 15 and 65 respectively) per working group person (person between the ages 15-65) (see appendix B).	CBS, 2023l
elderly youth ratio	demographics	Index indicating the proportion of people over the age of 65 years compared to the proportion of people under 15 years old (see appendix B).	CBS, 2023l
ethnic diversity index	demographics	Ethnic diversity representation using the Shannon-Wiener index (see appendix B).	CBS, 2023l
voter turnout rate	politics	Percentage of eligible voters who cast a vote in the parliamentary elections for the Second Chamber.	Kiesraad, 2017 & 2021
political party preference	politics	The political party that received the most votes in the parliamentary elections for the Second Chamber.	Kiesraad, 2017 & 2021
accessibility index	development	The accessibility index measures the average distance, calculated by road, from each resident in a given area to various amenities and transportation facilities. It includes the following components: childcare facilities, sports terrains, green areas and train stations (see Appendix B).	CBS, 2023l
neighbourhood density	development	The average neighbour density per municipality in square kilometres. The neighbourhood density of an address is computed by the number of addresses within a one-kilometre radius of each address, divided by the area of the circle.	CBS, 2023l

Note. All variables are on the municipal level for the time period of 2016 until 2021.

Appendix B: Elucidation of variables

The data utilized for constructing and standardizing the variables presented in this appendix is sourced from the same data sources as the other variables, this is comprehensively explained in the data collection section of the methodology.

Construction of variables

Ethnic diversity index

The Shannon-Wiener index is considered a robust measure for quantifying ethnic diversity within a population into a single measure. In the research paper on ethnic diversity measurement, Spellerberg & Fedor (2003) discuss the effectiveness of the Shannon-Wiener index in capturing the richness and evenness of ethnic groups within a given population.

This index is derived from communication theory and addresses a fundamental question: how can we anticipate the succeeding letter in a message or communication? The level of uncertainty is quantified using the Shannon Function H', which represents the measure corresponding to the concept of entropy, defined by the formula:

$$H' = -\sum(p_i * ln(p_i))$$

(B1)

Where p_i represents the proportion of individuals belonging to the ith ethnic group, and ln denotes the natural logarithm.

By calculating the index, it quantifies the diversity of ethnic backgrounds present in a population, taking into account both the variety of ethnic groups and their relative representation. The three ethnic groups used in this paper are Dutch, Western, and Non-western.

Interpreting the Shannon-Wiener index is straightforward. A higher index value indicates a greater level of ethnic diversity or heterogeneity within the population. This implies that there is a more balanced distribution of individuals across different ethnic backgrounds. Conversely, a lower index value suggests less diversity or a more concentrated distribution of individuals within one or a few dominant ethnic groups.

Dependency ratio & Elderly-youth ratio

The dependency ratio is a crucial measure used for analysing the age distribution within a population. It offers insights into the number of individuals who depend on the working-age population. Dependents in this context are defined as individuals below the age of 15 and those who are 65 years and older. The dependency ratio is calculated using the following formula:

$$dependency\ ratio = \frac{(P_{0-15} + P_{65+})}{P_{15-65}} * 100$$

Here, P_{0-15} represents the population aged 0-15 years, P_{65+} refers to the population aged 65 years and above, and P_{15-65} denotes the population aged 15-65 years.

Interpreting the dependency ratio provides valuable insights into the societal implications of population age structure. A higher dependency ratio signifies a larger proportion of dependents, such as children and the elderly, relative to the working-age population. This suggests a greater demand for social services, healthcare, and pension systems, as the burden of supporting dependents falls on a smaller segment of the population. Conversely, a lower dependency ratio indicates a smaller proportion of dependents, which can potentially result in a more favourable economic and social outlook, with a larger working-age population capable of driving productivity and contributing to the overall well-being of society.

The phenomenon of population ageing has received significant attention, particularly in developed regions, due to declining birth and death rates. Population ageing occurs when the proportion of children decreases while the proportion of older individuals increases. However, the aforementioned measure does not provide an accurate estimation of ageing since it is influenced by the relative population size in other age groups. To address this limitation, an alternative measure called the elderly-youth ratio is used, which offers a more comprehensive evaluation of population ageing. The formula for this measure is as follows:

$$elderly - youth\ ratio\ = \frac{P_{65+}}{P_{0-15}} * 100$$

(B3)

In the formula, P_{65+} represents the population aged 65 years and above, and P_{0-15} denotes the population aged 0-15 years. The elderly-youth ratio provides a ratio of the older population (65 years and above) to the youth population (0-15 years).

Interpreting the elderly-youth ratio involves understanding the ratio it presents. A higher value indicates a larger proportion of older individuals compared to the younger population, which reflects a more pronounced ageing phenomenon. Conversely, a lower value suggests a smaller proportion of older individuals in relation to the young population, indicating a younger population structure.

Accessibility index

Mean accessibilities, all in kilometres, are calculated using the accessibility index. This index is a measure that combines the distances to various amenities, including childcare facilities, sports terrains, green spaces, and train stations. The goal is to provide an overall representation of the average accessibility to these amenities. In the calculation, the closest distances to each of these facilities are

considered, and any missing values are ignored. By incorporating multiple factors into a single metric, the accessibility index offers insights into the overall accessibility experienced by the population of a municipality.

$$accesibility\ index\ = \frac{\sum n_i}{i}$$

(B4)

Here, n_i represents the closest distance to a childcare facility, sports terrain, green space, or train station, measured in kilometres. The sum of these distances is divided by the total number of amenities considered. The resulting value represents the mean accessibility index, providing an average measure of the closest distances to these amenities.

Interpreting the accessibility index offers valuable insights into the overall accessibility of amenities within a given area. A lower accessibility index suggests that, on average, the amenities considered are more easily reachable. Conversely, a higher accessibility index implies that the amenities are, on average, located farther away, which may present challenges in terms of reaching and utilising these facilities.

Variable standardization

Crime rate

The variable *crime rate* is standardized using the following formula:

$$crime\ rate\ = \frac{total\ number\ of\ crimes}{municipality\ population} * 10,000$$

(B5)

Youth crime rate

The variable *youth crime rate* is standardized using the following formula:

$$youth\ crime\ rate\ = \frac{total\ number\ of\ youth\ crimes}{municipality\ population} * 10,000$$

(B6)

Involvement divorce

The variable *involvement divorce* is standardized using the following formula:

$$involvement\ divorce\ = \frac{total\ number\ of\ children\ involved\ in\ divorce}{municipality\ population} * 10,000$$

(B7)

Child abuse rate

The variable *child abuse rate* is standardized using the following formula:

$$child\ abuse\ rate\ = \frac{total\ number\ of\ reported\ child\ abuse\ cases}{municipality\ population} * 10,000$$

<div align="right">(B8)</div>

Education disadvantage score

The variable *educational disadvantage score* is standardized using the following formula:

$$educational\ disadvantage\ score\ = \frac{municipality\ educational\ disadvantage\ score}{municipality\ number\ of\ students}$$

<div align="right">(B9)</div>

In this study, the educational disadvantage score with a threshold is used. For further information on this variable, please consult the report by Posthumus, Scholtus, and Walhout (2019).

Appendix C: Regression models

Table C1. Weighted least squares regression results

	Dependent variable:		
	Stevig Ouderschap	**VoorZorg**	**GKA**
vaccination rate	-0.001	-0.011	-0.005
	(0.013)	(0.013)	(0.009)
child abuse rate	0.002	0.003	0.001
	(0.006)	(0.005)	(0.003)
welfare families	0.004	0.077	-0.036
	(0.072)	(0.126)	(0.039)
youth crime rate	0.002	0.002	0.011
	(0.01)	(0.009)	(0.008)
life expectancy	0.002	-0.011	0.024
	(0.05)	(0.056)	(0.039)
population	-0.0	0.0***	-0.0
	(0.0)	(0.0)	(0.0)
population density	0.0	0.0	-0.0
	(0.0)	(0.0)	(0.0)
economic wellbeing	0.002	-0.004***	-0.002**
	(0.001)	(0.002)	(0.001)
neighbourhood density	-0.0	-0.0***	-0.0
	(0.0)	(0.0)	(0.0)
school dropout rate	0.22	0.229	-0.046
	(0.185)	(0.154)	(0.129)
municipal levies	-0.0	-0.0	0.0
	(0.0)	(0.001)	(0.0)
crime rate	0.002**	0.0	0.001
	(0.001)	(0.001)	(0.001)
unemployment rate	0.401	-0.26	-0.068
	(0.376)	(0.172)	(0.154)
poverty rate	-0.13	-0.018	0.083
	(0.112)	(0.14)	(0.06)
physical health	-0.05***	-0.04**	-0.023*
	(0.016)	(0.018)	(0.014)
psychological health	-0.001	-0.004	-0.024**
	(0.015)	(0.014)	(0.01)
sport weekly	0.009	0.02*	0.012
	(0.01)	(0.012)	(0.008)
alcohol consumption	0.003	-0.008	0.012
	(0.011)	(0.011)	(0.009)
smoking habits	-0.022	-0.033	0.029
	(0.036)	(0.031)	(0.022)
ethnic diversity index	-0.534	-0.348	0.493
	(0.551)	(0.6)	(0.415)
age dependency ratio	0.065	0.24	-0.612
	(1.223)	(0.995)	(0.711)
elderly youth ratio	-0.052	0.206	-0.125
	(0.209)	(0.127)	(0.099)
accessibility index	0.022	-0.048***	0.003
	(0.018)	(0.017)	(0.013)
educational disadvantage score	-0.112	0.044	0.345
	(0.321)	(0.449)	(0.21)
voter turnout rate	0.028	0.03	0.003
	(0.023)	(0.023)	(0.016)
Constant	-0.15	3.035	-0.12
	(4.61)	(5.256)	(3.685)

Table C1. Weighted least squares regression results (continued.)

Observations	338	338	338
R-squared	0.292539	0.354483	0.552638
Adj. R-squared	0.235851	0.302759	0.516791
Residual Std. Err.	94.83022	92.18708	75.49535
F-statistic	5.2799***	7.3286***	21.9558***

Note. The columns represent the outcomes of different regression models for three programmes: Stevig Ouderschap, VoorZorg, and GKA. Coefficients are presented with their robust standard errors in parentheses below them. Significance levels are indicated by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.