

## Developing systemic Public Policy Theory for Multi-problem Households

G.A. (Guido) Veldhuis<sup>1\*</sup>  
S. (Sebastiaan) Deuten<sup>1</sup>  
R. (Remy) Vink<sup>1</sup>  
I. (Ilona) Wildeman<sup>1</sup>  
C. (Caren) Lanting<sup>1</sup>  
L.W.P. (Lili) Bannenberg<sup>2</sup>

<sup>1</sup>TNO - The Netherlands Organisation for Applied Scientific Research

<sup>2</sup>Ministry of Justice and Security  
THE NETHERLANDS

[Guido.Veldhuis@tno.nl](mailto:Guido.Veldhuis@tno.nl)

### Abstract

A policy theory is based on the underlying assumptions concerning the input, activities, output and outcomes of a policy. TNO and the Dutch ministry of Justice and Security have identified a need for new methodology to formulate public policy theory for multi-sectoral challenges. A focus point lies on integrating knowledge from within and outside government within a systemic worldview. Furthermore, the process of developing policy theory should accommodate for dialogue across government leading to a shared understanding of societal challenges and effective policy measures. As a test case we are exploring the societal issue of multi-problem households (MPH). Multi-problem households are single persons or families that face a complex mix of socioeconomic and psychosocial problems. To form the basis for a new policy theory we have used a mix of qualitative system dynamics, group model building, literature searches and data analytics. Through a series of workshops, events and collaborations we are exploring a new way to create and share systemic insight across government. We report our findings from the problem structuring phase and investigate some of the relations within a qualitative model using quantitative analysis of a dataset of Dutch households (N= 6.628.100).

### 1. Introduction

MPH are defined as households of at least one adult and possibly one or several children that struggle with a chronic complex of socio-economic and psychosocial problems, which the care workers involved find resistant to change (Ghesquière, 1993). Literature also refers to: multi-problem families, families in multi-problem situations, troubled families and vulnerable families (Asen, 2007; Morris 2013; Tausendfreund, 2017). Ghesquière (1993) noted that the problems that households face are *multiple, varying and complex*.

The households in question often face several problems in different areas of life at once, for example: crime, poor housing, financial debt, poor health, psychiatric problems, relational problems and unemployment. Complex patterns of problems arise due to the interaction effects between problems, often affecting all persons in a household including children. The presence of several risk

## Conference proceeding off the 38th ICSDS, Bergen, Norway 2020

factors within a family, such as emotional problems, chronic illness and poor housing have been shown to significantly increase the risk of development problems in children. The tragedy of multi-problem households is that often problems are passed on to the next generation (Buehler & Gerard, 2013; Spratt, 2012). A complex mix of problems results in situations in which everyday life itself becomes a struggle. In addition to the separate problems the households face, the ability of the persons within the household to adequately resolve problems is limited. As Tausendfreund et al. (2016) stress: *'it is not the lack of problems that distinguishes other families from families in multi-problem situations, it is their ability to solve problems in a persistent way'*.

There are currently between 75,000 and 116,000 families with problems in multiple areas in the Netherlands (Berg & Baat, 2012). It is estimated that 3% to 5% of families have multiple problems (see also Figure 3 and Figure 4) (Steketee & Vandenbroucke 2010; Astri, 2012; Ministeries SZW, VWS, BZK en JenV, 2019). A larger proportion lives in urbanized areas, and a relatively large part of this group has a non-Western migration background.

Several studies focus on the effectiveness of care towards MPH (see for example: Tausendfreund, 2017). However, the complex interactions between problems appears to remain elusive. As the Dutch professional youth care directive for MPH states: *'there is no clear pattern in cause and effect, problems and characteristics interact back and forth and on different levels (within a member, between members, between members and the environment and between the household and care workers)'* (NVO, BPSW, NIP, 2015).

Experts in the field agree that the various problems must be tackled together. For this it is important that chain partners (care organizations, public safety, welfare institutions) work together in an integrated approach, and this also requires an integrated approach between the affiliated ministries. It appears to be difficult to achieve this in practice. Bottlenecks are encountered and policies and laws are shaped by different information positions and different perspectives on the problem. Current issues consist of: i) problems that are tackled separately, ii) many changes in professionals whereas families benefit from structure, iii) providers of social-, care- and safety assistance differ in objectives or working methods, are seldomly cooperating, and sometimes even counterproductive, iv) most interventions are not tailor-made, and miss their potential effect, v) legislation and regulations sometimes have a negative or counterproductive effect.

This type of social policy problem is described as a “wicked” problem, since MPH are often unique, underlying problems are misunderstood or perspectives on what the problem is differs and there is no permanent ‘fix’ (Rittel & Webber, 1973). Bottlenecks in local and national policy and legislation and counterproductive incentives that arise from these seem to play a role.

The Ministry of Justice and Security (J&V) wants to improve policy on multi-problem households (MPH). The ambition is to identify and formulate improved policy on the most important factors and problem dynamics in the various areas that affect MPH. To this end, it has taken the initiative to carry out a system analysis on MPH. A systemic analysis is carried out to form a basis on which new policy theory can be developed in collaboration with other ministries.

This asks for a process that brings together stakeholders from multiple domains, and is able to provide insight to wicked problems and counterintuitive results of policy (Black, 2013; Vennix, 1996). We use a mix of qualitative system dynamics, group model building, literature searches and data analytics brought together in the causal loop diagram-based MARVEL method to explore a new way

## Conference proceeding off the 38th ICSDS, Bergen, Norway 2020

to create and share systemic insight across government (Veldhuis et al., 2015). The following research question is central to the process:

Can a system dynamics analysis contribute to an interdepartmental shared policy theory for interventions in the MPH phenomenon, where explicit attention is paid to the coherence of phenomena and interventions?

In answering this main question, specific attention is given to the following aspects: i) how the method contributes to a richer and shared problem image, ii) whether it facilitates insight in interdependencies between policy areas, and iii) if it achieves a more integrated and richer perspective for policy interventions and action. The next section provides a more in-depth discussion of the project goals and method used.

## 2. Method

The ministry of Justice and Security, together with TNO, and other ministries, aim to develop a new approach to formulate policy theory aimed at multi-sectoral challenges. The current study is an experiment, aimed at better understanding the complexity of multi-problem households.

In this section we will discuss the techniques and process used to conduct the study, an overview is presented in Table 1.

*Table 1 Overview of project goals, techniques used and model results*

| Project goals                   | Technique   | Model result  |
|---------------------------------|---|---|
| Establish suitability of method | Expert sessions<br>Desk research                                      | Preliminary model   |
| Develop a shared problem view   | Group model building<br>Stakeholder sessions                          | MPH problem model 1.0<br>MPH problem solving capacity model 1.0 |
| Validation of problem view      | Expert sessions<br>Systematic literature search<br>Microdata analysis | MPH Model 2.0<br>MPH problem solving capacity model 2.0         |
| Perspective on action           | Expert sessions<br>Desk research                                      | Unhealthy lifestyle model<br>Financial Debt model               |

The principle technique used is modelbuilding with causal loop diagram. Several separate, but related, causal models are developed, using a variety of data gathering techniques and group processes. All models are developed using TNO's MARVEL software (Veldhuis et al, 2015). The methodology used is incremental, participative and stakeholder driven. Three types of workshops were used:

**Expert sessions** to gather and discuss information on specific aspects of a problem. Stakeholders varied per session, including national and local civil servants, academics and researchers. The group size ranged from 3 to 18 persons.

**Group model building:** Structured model development workshops, following the group model building process (GMB) with a group of 12 national government policy makers (Vennix, 1996).

## **Conference proceeding off the 38th ICSDS, Bergen, Norway 2020**

**Stakeholder sessions:** Small meetings and large plenary sessions to inform and discuss results with a community of stakeholders. Size ranged from 2 to 100+ persons per sessions, mostly from the government departments that were involved, including senior level.

The study was conducted in three incremental phases:

### **Phase 1: Establish suitability of the method**

A preliminary study was carried out to assess if causal loop diagrams developed with MARVEL can capture the dynamic complexity of MPH. Several expert sessions were held, and a short survey of available literature carried out. Results of this phase were discussed in several sessions with stakeholders.

### **Phase 2: Development of a shared problem perspective**

In the next phase, four government ministries were invited in the development of a shared problem perspective, captured in a causal loop diagram (CLD) using TNO's MARVEL approach (Veldhuis et al. 2015) and the GMB process as proposed by Vennix (1996). Twelve policy makers from the ministries of: Justice and Security; the Interior and Kingdom Relations; Social Affairs and Employment; Health, Welfare and Sport were involved in three Group model building sessions. The aim of the sessions was to extend the preliminary model and discuss the merit of the approach for formulating a shared basis for policy theory. The modelling effort focused on two dimensions of the problem, resulting in two separate models: 1) The MPH model, that describes the interactions between the various socioeconomic and psychosocial problems an MPH faces, and 2) the MPH problem solving capacity model, describing steps and determinants in the process of problem solving.

Sessions consisted of group and plenary work focussed on several key questions, such as: Which problems MPH face should be included in the model? How do problems interact, can you add a feedback loop? Which relations in the model are not correct? What causes an MPH to struggle with resolving a problem?

A separate stakeholder session was held with key researchers from the four ministries and researchers from the Dutch Central Bureau of Statistics. The aim of this session was to prepare phase 3: the further validation and interpretation of the models. Topic of discussion was operationalisation of the model variables and data gathering.

### **Phase 3a: Validation of the problem hypothesis**

Two data collections were carried out to 1. establish the prevalence and co-occurrence of problems MPH face and 2. to validate the causal relations hypothesized during the GMB session. Data collection was carried out with two techniques: 1) a systematic literature search, 2) descriptive statistical analysis of microdata.

#### Systematic literature search

The systematic literature search was carried out by TNO experts on the issue of MPH. To design the searches, the PICO-process was applied. PICO stands for: Population, Indicator, Comparison and Outcome. This is a systematic approach to formulate search questions and execute a literature search strategy (Heneghan & Badenoch, 2006). PICO's were formulated to cover all relations in the MPH-model. Searches were conducted in Scopus and limited to the years 2010 to 2020 and to meta-analyses, or if this resulted in no hits, to systematic reviews or cohort studies. For the selection of studies, the GRADE approach was applied (Grading of Recommendations Assessment, Development

and Evaluation), a method to assess quality of evidence and strength of recommendations (Guyatt et al., 2008). The aim of the systematic literature search was to find evidence for the assumed relations between the factors in the MPH model. If other relations were found of which causality is strongly advocated, these were selected for potential inclusion. Research relying on cross-sectional designs were not included due to its low evidence for causality. The strengths in Figure 7 have been carefully chosen based on the systematic literature search, microdata analysis and expert discussions. Relations have been questioned on whether full mediation through other model factors and connections already exists. Still any assumed causal relations in these dynamic hypotheses might be due to co-occurrence and could be found irrelevant.

#### Microdata analysis

Statistical analysis was performed using the Microdata catalogue of Statistics Netherlands (CBS). The microdata catalogue is a set of linkages between government and non-government databases that enables data collection at the individual person and household level. The catalogue contains a vast amount of pseudonymization data on citizen interaction with healthcare, schools, police, tax authorities etc. For each problem variable in the MPH problem model one or several indicators were identified. Due to the broad scope of the model an overwhelming amount of data was available. When available, indicators were adopted from existing government 'monitors'; yearly data collections used to track the use of government services and monitor the state of society.

Based on these indicators a dataset was created of the Dutch population from which subsequently the MPH population was selected. Descriptive statistics were then gathered that reveal the prevalence and co-occurrence of problems MPH face. Suitable techniques for inferential statistical analysis are still being investigated.

## **3. Results**

### **Phase 1**

The first phase resulted in a concept of two models: the MPH-model and the problem solving capacity model. This gave participants a sense of common language to approach the complex issue of MPH. This resulted in support and commitment from a small group of key stakeholders and senior-level management within the four ministries.

### **Phase 2**

In the second phase the models were expanded and refined in three sessions with larger groups of stakeholders from the ministries. Also, national government programs and other activities were mapped. The resulting models are unique in bringing all relevant factors visually together in a way that is understandable for all sectors within the ministries. Stakeholders now have a common sense of urgency and a common language, focus and knowledge base, where this previously was often approached from the separate policy areas. Next to that, the MARVEL tooling enabled the exploration of specific loops and pathways by visually highlighting system structure. This was welcomed by stakeholders as a welcome decision aid in determine starting points for discussions, cross-sectoral overlap and overlooked problems in other domains. The models were also discussed with municipalities.

## **Conference proceeding off the 38th ICSDS, Bergen, Norway 2020**

Together with the group the model boundaries were determined. Since the model was intended to inform policy discussion a criterion was conciseness. Furthermore, the 'domains of life' were selected as a high-level category that would cover relevant policy and implementation areas of responsibility.

### Two models and level of aggregation

The MPH domain model (Figure 7) only contains problems. From a system dynamics perspective, all feedback loops in the model are reinforcing, since problems can only trigger or aggravate other problems. However, multiple characteristics of the MPH and its members will influence the ability to deal with problems. For example, the availability of a supporting social network, cognitive ability and previous experience with government and care institutions. Psychological stress appeared in many discussions as an important risk factor, both triggering other problems (such as addiction) and influencing the ability to resolve problems (Figure 9). For these reasons a decision was made to develop two models throughout the phases. Both are discussed in the results of phase 3.

The MPH domainmodel is set up as generally applicable to all households, without each loop being (always) 'active' for each household. For individual households certain loops can be more dominant in different time segments, or specific loops can be of no effect at all for a certain MPH. The MPH problem solving capacity model has been set up as generally applicable to each individual, and including interaction with other individuals. The problem solving capacity model thus describes how each separate problem is dealt with (a balancing feedback loop). However, problems can accumulate within a household. When problems accumulate chronic stress accumulates. Chronic stress reduces the efficacy of several factors which are relevant for problem solving.

The microdata analysis has focused on the aggregate level of all MPH households. During phase 1 the two models have been set-up from the perspective that different levels of aggregation are feasible to include in discussions on public policy and interventions. Thus, two levels of aggregation are included in the models: one on the individual level (the problem solving capacity model), one on the household level (the domainmodel), and finally the aggregate level of all multi-problem households was generally discussed with the stakeholders based on these two models, and used in the microdata analysis. During phase 2 an aggregate level model has been briefly discussed.

### **Government initiatives**

### Phase 3

The international, Dutch and grey literature has been systematically searched for scientific evidence for the relationships mentioned in the MARVEL life domain model (see Figure 2). Initially, the model was built on the basis of assumptions and expert knowledge. On the basis of the literature study, we can conclude that these assumptions are generally correct: sufficient and significant evidence has been found for most relationships between problem (areas)<sup>1</sup>. Many strengths of relationships lie between odds ratios of 1.0 and 2.0. Although statistically a moderate strength, this is normal for epidemiological studies on complex social themes. It must be borne in mind that the relationships

<sup>1</sup> Due to the scope of this conference paper we will not discuss these results in detail. An extensive report is available in Dutch.

## Conference proceeding off the 38th ICSDS, Bergen, Norway 2020

between problem areas have been examined separately and that the interaction between problems has not been explicitly sought, except as ancillary catch.

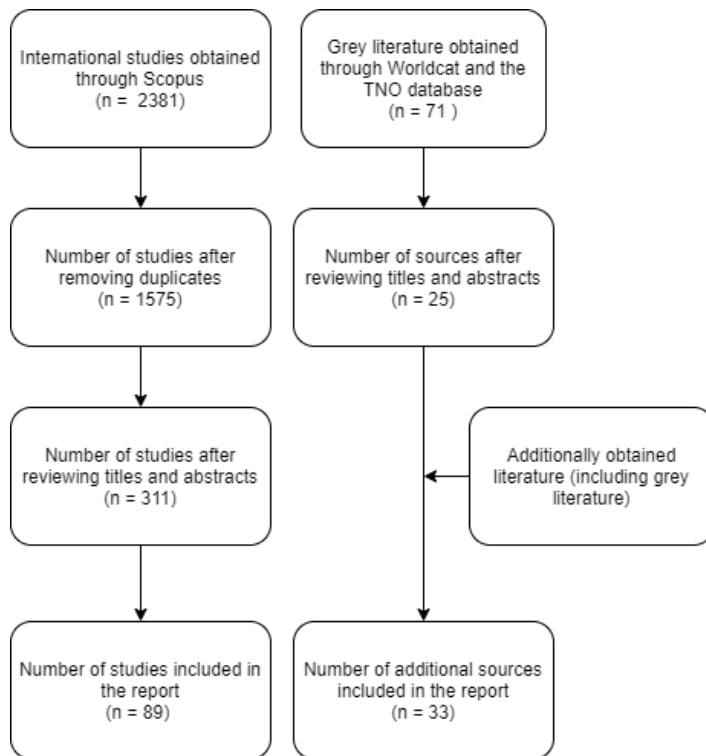


Figure 2 Structured literature review

Insufficient evidence has been found for the relationships with structural daily activities. There can be several reasons for this. First, little research has been conducted on this variable. As a result, we cannot conclude that there is no connection with, for example, addiction problems, crime, position on the labor market, neighbourhood / housing or poverty. Another reason may be that the structural day schedule is a typical Dutch phenomenon that is valued differently in other countries, is not an adequate international search term and therefore little research is available.

The general picture from this systematic literature review is that many problems are related to a low Social Economic Status (SES): a combination of the factors income, work and education level. We conclude that MPH have a high probability of belonging to the low SES group. Much research has been conducted into the link between low SES and other problems. A low SES creates many other problems and stress, which has repercussions on families and people's psychological health. This effect continues over several generations through a process of social learning, neuro-biological influences on the development of children and is perpetuated by the unequal opportunities in society.

Strong relationships have been found in relation to the variables quality of family relations and mental health. This is understandable as the family / household and the mental health of individuals within it can be both a source of problems and can be disrupted by other external problems.

The study confirms the accumulation mechanism of separate problems that together cause vicious circles (feedback loops) and paths where it is likely that the effects also accumulate or even reinforce each other. However, the strength of these feedback effects cannot be determined based on the literature study. Conversely, there is not one problem area or relationship that stands out as the



## Conference proceeding off the 38th ICSDS, Bergen, Norway 2020

strongest, as a result there is not one (golden) solution direction. This underlines the importance of tailor-made solutions for individual MPH and sufficient scope for this in national policy.

### Microdata results

Microdata collection for all variables in the model is currently on-going. As a preliminary analysis the existing *Multiproblematiek particuliere huishoudens 2016* dataset was used, developed by Statistics Netherlands for The ministry of Social Affairs and Employment (CBS, 2019). The dataset contains all households in the Netherlands with at least one person between the age of 18-75 (N= 6.628.100). Data was collected in 2016. Only 300.000 households are missing from the dataset, amongst others: active military personnel and citizens with an address in the Netherlands but occupations abroad.

Currently we will limit our analysis to an example. Multiple indicators were combined to derive an indication if a household had to face any of the following problems in 2016: Debt, Adult delinquency, Juvenile delinquency, Used mental health care, Low income, Exceptional incurred health care costs (see Table 2).

*Table 2. Composed problem indicators*

|  |   |
|--|---|
| Debt                                   | In these households, at least one person received a court ruling for a debt restructuring ( <i>WSNP</i> ) process in 2016, or was registered as a defaulter at a health insurance company.  |
| Adult delinquency                      | At least one adult person in these households was registered in 2016 as a suspect, whose case was settled by court or who was detained.   |
| Juvenile delinquency                   | In these households at least one underage person was registered in 2016 as a suspect, whose case had been settled by the judge, had received a juvenile intervention ( <i>Haltstraf</i> ), had been in contact with juvenile rehabilitation or had been detained.                       |
| Used mental health care                | At least one person in these households declared mental healthcare ( <i>GGZ</i> ) costs in 2016 to a health insurer or received a reimbursement for psycholeptics or psychoanaleptics.  |
| Low income                             | In 2016, these households had an income below the low-income limit.   |
| Exceptional incurred health care costs | In these households, at least one person in 2016 was reimbursed for somatic, specialist mental health care or medical care costs in the highest quartile, or claimed costs for four or more groups of medicines with a health insurer, or received a deduction for specific care costs. |

From the relatively small set of indicators explored so far ~60% of the households in the Netherlands have encountered at least one of the selected problems. A far smaller group (~30%) has encountered multiple problems (Figure 3). 9% of the households have an indication of four or more of the selected problems. Mental health and health related issues are by far the most frequently observed problems, followed by low income (Figure 4).

## Conference proceeding off the 38th ICSDS, Bergen, Norway 2020

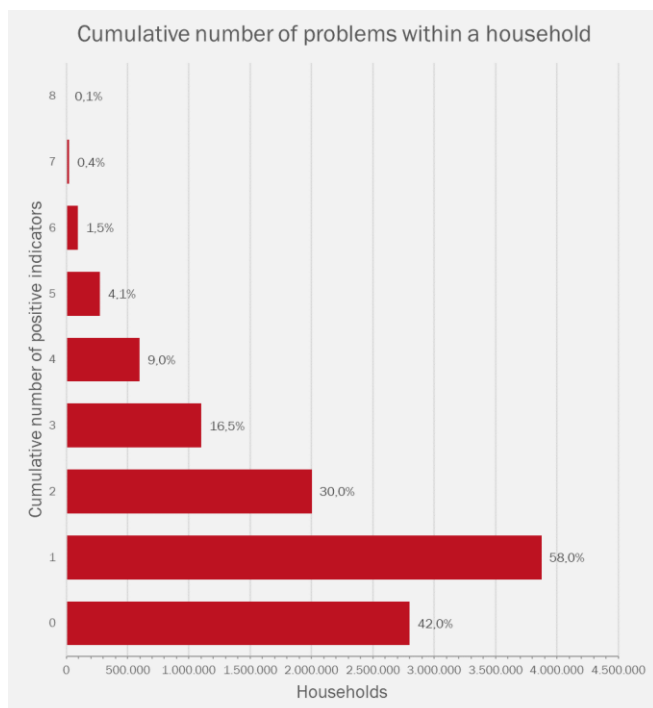
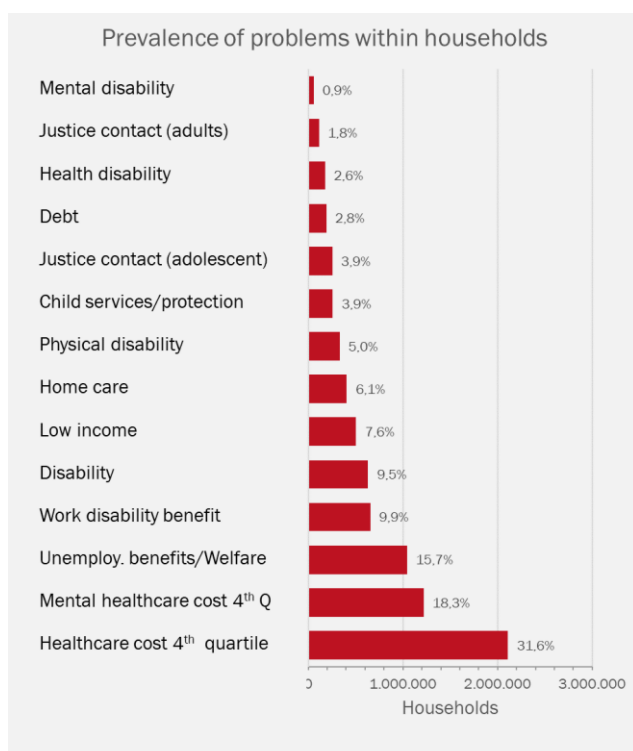


Figure 3 Frequency of problems encountered by households selected from test data. The total set of problems included in the test dataset is far less than the actual number of relevant problems, thus data presented here is an underestimation.



\*N = 6.780.500

Figure 4 Prevalence of selected problems

## Conference proceeding off the 38th ICSDS, Bergen, Norway 2020

Mental health and health related issues are by far the most common issue, Figure 5 shows that these two problems are consistently followed in order by: low income, debt, adult delinquency and finally juvenile delinquency.

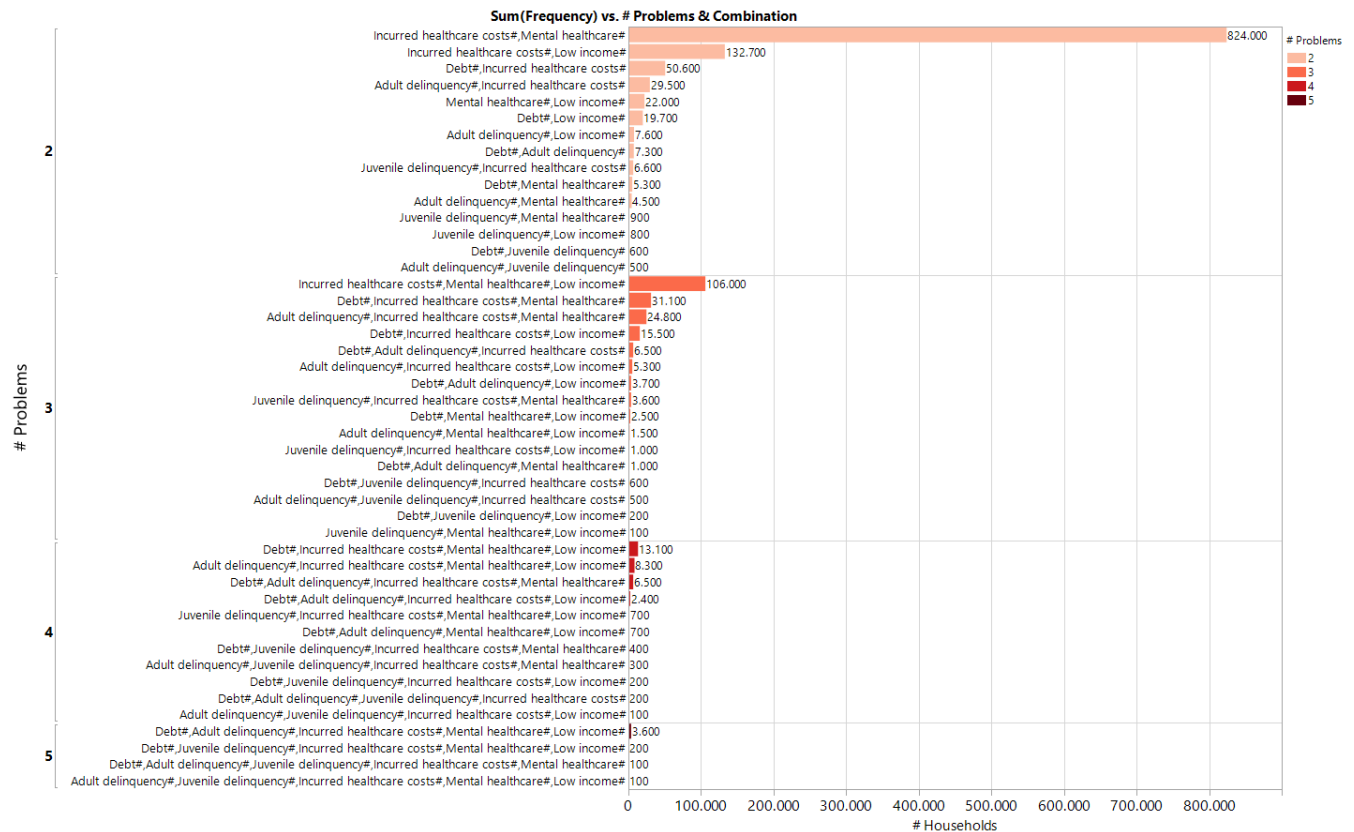


Figure 5 Frequencies of combination of problems, categorized on the total number of problems (on the left)

The MPH model hypothesizes multiple interactions between problems. Based on the limited data available at this point we can investigate the co-occurrence of several of these problems. In addition, we can analyse how the accumulation of several problems can lead to an increased risk of an outcome. Figure 6 presents group sizes (n) and the relative risk (x). Increased risk of coming into contact with the judiciary, given the accumulation of other problems.

## Conference proceeding off the 38th ICSDS, Bergen, Norway 2020

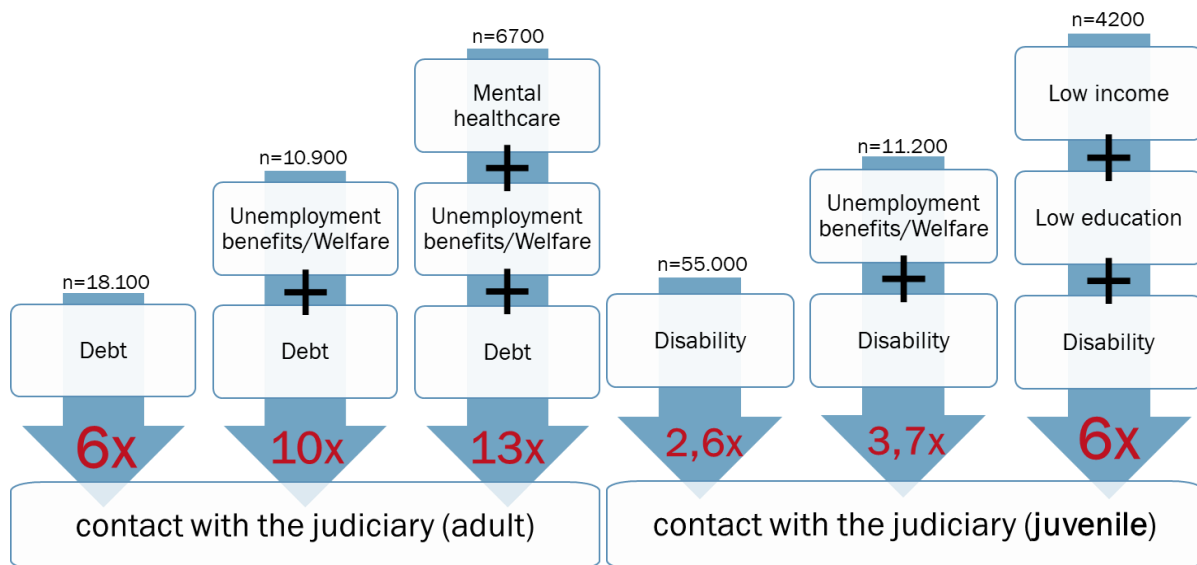


Figure 6 An example of the 'relative risk' analysis that was used to determine the effect of problem accumulation on an outcome.

### Model descriptions

#### Life domain model

The MPH-model contains seven 'domains of life': Safety & Security, Family, Education, Health, Housing, Financial and Participation (see Figure 7). The domains each depict highly aggregated variables for the several socio-economic and psychosocial problems MPH face, and the assumed most relevant causal influences, together forming the dynamic hypothesis (capital letters in the following description refer to the variables in the model diagram).

In the domain of Safety & Security, Delinquency and disturbance is influenced by many aspects, among which employment and employability. Employment is one of the basic prerequisites to reduce the risk on recidivism (Weijters et al., 2018). The employment construct here includes employability. When Criminal charges have been made against an individual, it can generally reduce the possible job types one could apply for, closing a loop which reduces employability and leaves the risk for Delinquency and disturbance lower than it could otherwise have been in the protective effect it has of being employed and widely employable.

A form of Delinquency and disturbance is domestic violence. Domestic violence, amongst other Criminal charges, can lead to Detention/Imprisonment, which can possibly Disrupt family dynamics. Disrupted family dynamics can in turn increase the risk for Delinquency and disturbance, closing another loop that leaves risks higher after incidents have occurred than would otherwise be the case.

Disrupted family dynamics can lead to developmental issues and this can cause mental health problems or addiction. Both increase the risk for Delinquency and disturbance, and even further add to Disrupted family dynamics. Moreover, Employment and employability adds to the Activities of daily living which inhibits the development of, and reduces the risks on developing addictions, or mental health problems.

Developmental issues or Mental health problems can limit Educational progress or cause children to Drop-out. This dynamic is also affected by Activities of daily living in the form of a structured daily

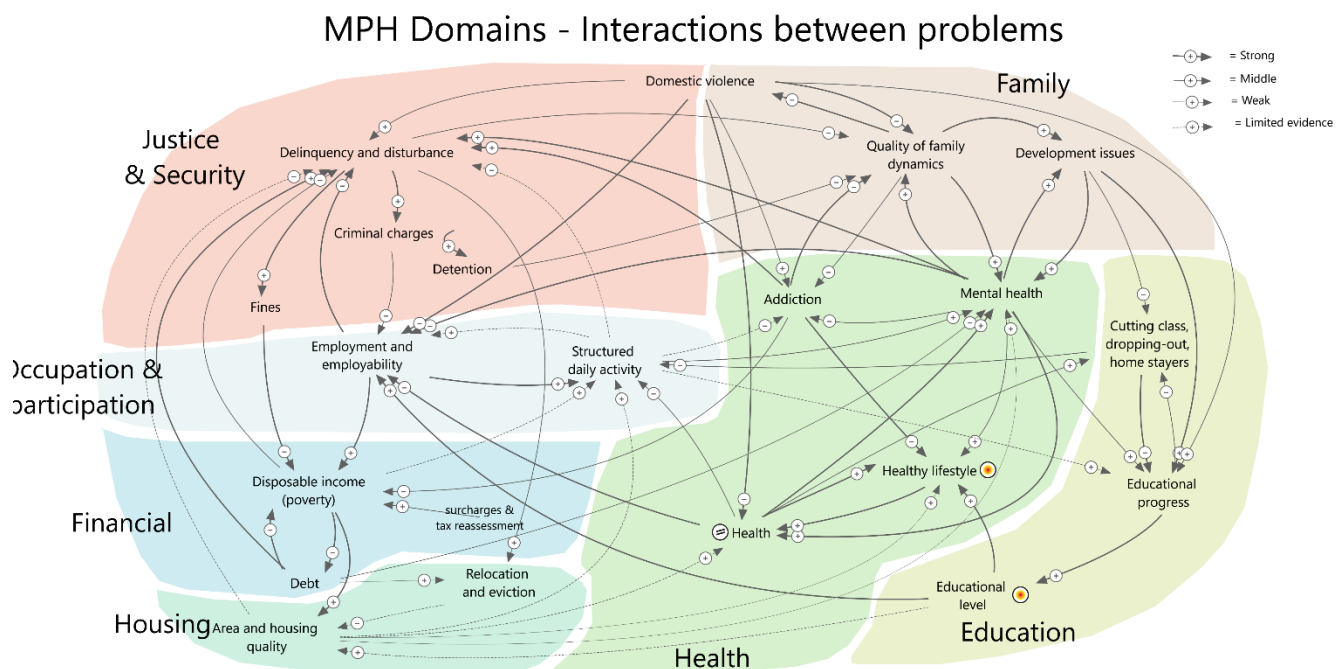
## Conference proceeding off the 38th ICSDS, Bergen, Norway 2020

scheme which includes time for education. Educational progress and Cutting classes closes a loop which limits the extent to, and increases the time it takes to achieve a certain Educational level.

Employment and employability, and Activities of daily living are both affected by the previously mentioned highly aggregated variables through Educational Level, but also by Chronic conditions such as Mental health problems or Somatic (physical) limitations or diseases. Moreover, the onset of chronic conditions can be slowed down, eliminated, or even reversed through a healthy lifestyle (World Health Organization, 1999, Molema et al. 2019). One of the influences to a healthy lifestyle are the routines and cognitions one has learned during childhood, like during education.

One of the contributions to Chronic conditions stems from the area and housing quality, in the forms of cleanliness of air outside, and the quality of the 'climate' inside the house such as proper heating, ventilation and other means that reduce health risks. Such standards of Area and housing quality vary by the knowledge of the individuals (Educational level), and their Disposable income. In addition, the Area and housing quality is affected by Relocation and eviction as a result of Debt or Delinquency and disturbance, and it in turn affects the established routines and possibilities for Activities of daily living, and changes the risks to Delinquency and disturbance dependent on the new environment.

Finally, Disposable income, received through Employment, can be used for Activities for daily living or reduction of Debt. The Disposable income itself is often found with MPH to be reduced by Addiction, high Debt levels, or Penalties and improperly received funds (The Dutch 'toeslagen' social welfare system), such as when a household has unrightfully received financial assistance from the government and needs to pay it back.



*Figure 7 Current version of the MPH domain model, showing 21 problems across 7 domains of life. Strength of the relations is based on expert-estimation following a structured literature review and data analysis. The model describes the problems that an MPH might encounter, but, the model as a whole is an aggregate (e.g. individual MPH will encounter a subset of the problems).*

Besides reviewing the problem dynamic, the model can be used to analyze the effect of government programs, particularly where these programs directly and indirectly interact. This provides more

## Conference proceeding off the 38th ICSDS, Bergen, Norway 2020

insight into possible synergies. There is a wide variety of interventions and programs that usually target specific problems with a focus on a domain. A brief inventory of government programs was carried out and their desired effects mapped. Figure 8 shows interventions and programs around the domain model, the arrows indicate their intended effects. Programs usually focus on a domain or are aimed at a specific problem. The figure illustrates the web of complexity of government intervention that surrounds the already complex reality of MPH.

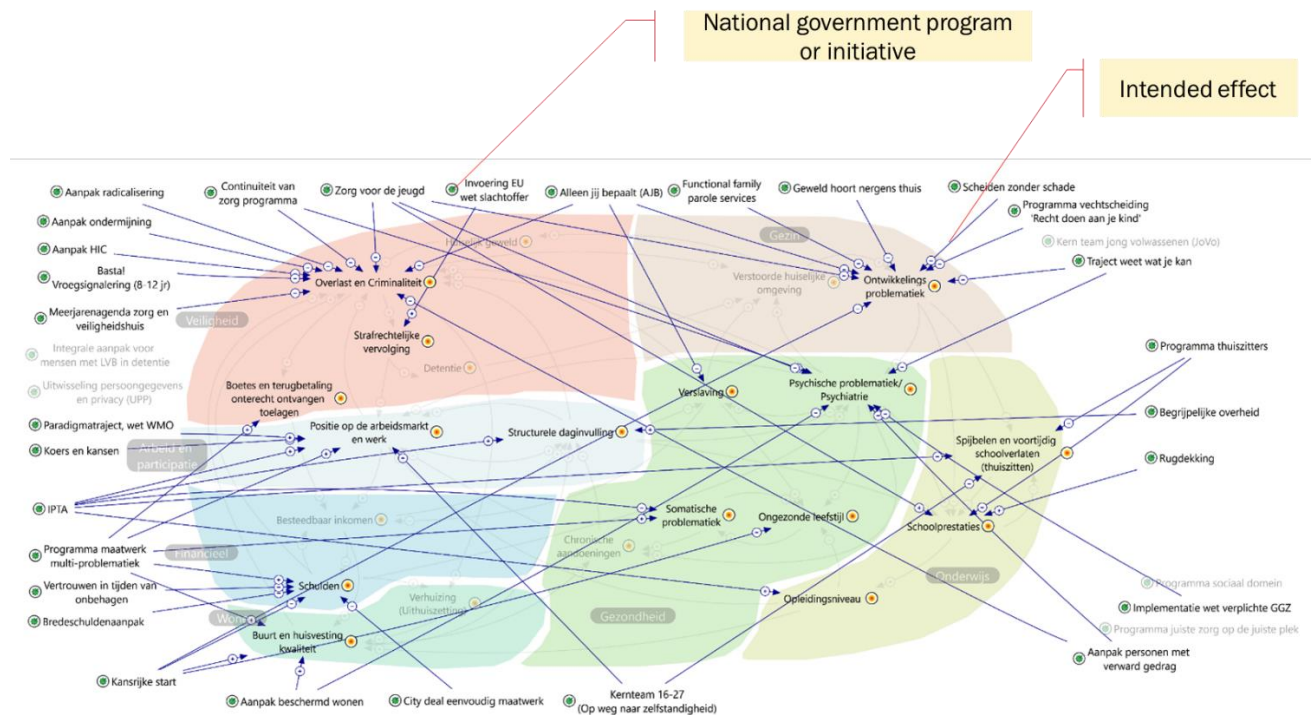


Figure 8 Several on-going government programmes and activities that could impact problems faced by MPH. Causal effects were mapped in phase 2 based on the stated aims of the programmes and activities.

### Problem solving capacity

When most households are faced with a problem, such as a traffic ticket, they are able to solve this problem, possibly with the right help. An MPH, on the other hand, is (over time) overwhelmed by problems and is often no longer able to solve a problem effectively and permanently. This has causes that have to do with their own problem solving capacity and with external factors, such as bottlenecks in legislation and regulations, ineffective care and social work and so on. This study focuses on the first part: the problem solving capacity of the household and the immediate environment. Limited problem solving skills can originate from a variety of factors, such as: cognitive and social skills, language and IT skills and previous experiences. The problem solving model (see Figure 9) is a self-correcting feedback loop that describes the steps by which a problem can be solved. People go through these steps consciously and unconsciously. In addition, the model can be applied on different time scales. For example, paying a fine can be solved in minutes, but can also take much longer. However, solving, or reducing, a health problem will take much more time, which may involve solving several sub-problems. The problem solving capacity model thus offers a framework for a diversity of starting points at different levels; from government policy influencing behavior to tailor-made solutions for care providers.

Central to the model are the following steps: the problem, identifying the problem, recognizing and accepting it as a problem, solution orientation, and effective implementation of the solution. The



model can be read as follows. Suppose a person commits a traffic violation, this will result in a traffic ticket. The collection of this fine must be able to reach the person, for this the person must have a residence and must also open and read the mail (detection). Next, the person must acknowledge that the ticket, right or wrong, is his or her problem and that action is necessary and will benefit the person. Taking no action in this case means that the problem is getting worse, for example due to added penalties. In the next step, a person looks at the solution options, for example making a payment arrangement or submitting a notice of objection. A large number of skills are already required for this. For example, someone must be able to properly read and interpret the information on the ticket. The last step concerns the actual effective implementation of the solution. For example, pay the fine. Again, this requires skills and resources, such as knowledge of and access to banking. When this last step has been successfully completed, the problem (the fine) will be resolved. However, if the fine problem is not solved, this can cause stress, which has a negative effect on the ability to solve the fine problem and other problems. The problem solving capacity is inhibited by stress as a result of the problem and the accumulation of other problems. Stress can, for example, also result in a reduction in courage, motivation and willingness, or an increased external locus of control (Rodenberry & Renk, 2010). The Verwey-Jonker Institute describes this as follows: "If this problem is not tackled structurally, the family remains in survival mode, which is accompanied by a lot of stress. When people suffer from chronic stress, this means that it is hardly possible to take the right decisions and come to sustainable solutions. This not only applies to the mother and father, the children also suffer from the stress" (Mullainathan and Shafir, 2013; Verwey-Jonker Institute, 2017 p7).

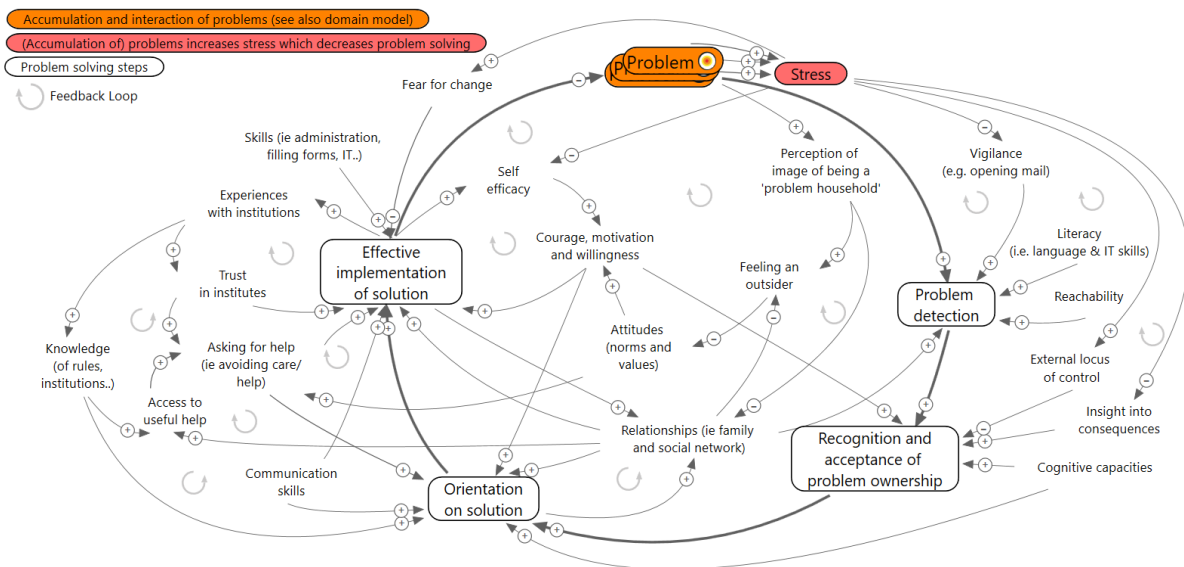


Figure 9 The MPH problem solving capacity model showing a balancing feedback loop with the goal of counter-acting the problems from the MPH domain model. As problems accumulate stress builds up, reducing the efficacy of many factors which are relevant for the successive problem solving steps.

## 4. Discussion

The current paper reports an on-going effort to use system dynamics as a basis for formulating public policy theory. Current results look promising. The use of GMB was successful at facilitating dialogue between four government ministries. The resulting models describe a rich and integrated perspective on the interactions between a broad variety of problems encountered within MPH across different domains of life. This is an important step forward from the current situation in which

## Conference proceeding off the 38th ICSDS, Bergen, Norway 2020

knowledge of the problem often remains fragmented and focused on separate policy or research areas.

Time was required in sessions for policy makers to become acquainted with the method. Discussing interactions between problem variables on a high-level was recognized as important and useful. Participants appreciated the sessions as they created an opportunity to focus on the content of the problem and a break from discussions on procedural issues, budget consideration or recent events.

Reflecting on the variables included in the problem solving capacity model we observe a bias. The model seemed directed at the ability of the MPH to interact with care givers and government institutions. We are currently investigating variables that might be relevant for problems closer to the members of the MPH themselves, such as poor health choices. In addition, most participants in the study indicated that the way aid and care is organized is sometimes ineffective or even aggravates the problem. This organization of aid and care was out of scope for the current study but seems to be an important topic for further investigation.

Analysis of micro-data seems promising. Considerable progress is being made across government to store and monitor data. The available data could be extremely useful in developing a deeper understanding of the prevalence of problems encountered within MPH, their co-occurrence, and their interactions. Using detailed quantitative data in combination with qualitative models appears to be a novelty within system dynamics. Suitable statistical techniques to investigate the microdata catalogue remain an object of study. Simple and combined frequency analysis, two-way interaction tables (odds-ratio's) and relative-risk analysis were found to be promising. We believe that, in this case, data analysis is more promising to inform policy than stock-and-flow simulation. The reason being that stock-and-flow simulation, or other simulation techniques, would require assumptions to be made on many relationships of which the dynamic cannot be observed and might be highly personal. Such assumptions might be possible on the population level and/or for subsets of the problems.

In summary, the research described here has been contributing to the dialogue, exchange of knowledge and formation of a shared vision on MPH through the different models, literature research and microdata analysis. An integrated and shared view on MPH is an important step toward new policy theory. This perspective is further strengthened by quantitative insight into the prevalence and interaction between problems that MPH face. However, this is still short of a perspective on which government action can be based. We continue to work towards developing action perspectives: defining avenues of interventions that deal with (aspects of) the problem, by developing more specific problem centric models and conducting data analysis. Future research will aim to develop problem centric (stock and flow) models and conduct micro data analysis of the most pressing problems faced by MPH.

## References

- Arnsten, A. F. (2009). Stress signalling pathways that impair prefrontal cortex structure and function. *Nature reviews neuroscience*, 10(6), 410-422.
- Asen, E. (2007). Changing 'multi-problem families'—developing a multi-contextual systemic approach. *Social Work & Society*, 5(3), 1-10.
- AStri (2012) Integrale aanpak multiproblematiek: Overzicht programma's en bewezen methodieken. Beleidsonderzoek en -advies, radar Bureau voor sociale vraagstukken. Leiden



## Conference proceeding off the 38th ICSDS, Bergen, Norway 2020

- Baumeister, R. F., & Heatherton, T. F. (1996). Self-regulation failure: An overview. *Psychological inquiry*, 7(1), 1-15.
- Berg, G. van den, & Baat, M. de (2012). Gezinnen met meervoudige problemen. In M. de Klerk, M. Prins, P. Verhaak & G. van den Berg (red.), *Mensen met meervoudige problemen en hun zorggebruik* (pp. 75-97). Den Haag: Raad voor de Volksgezondheid en Zorg.
- Black, L. J. (2013). When visuals are boundary objects in system dynamics work. *System Dynamics Review*, 29(2), 70-86.
- Buehler, C., & Gerard, J. (2013). Cumulative family risk predicts increases in adjustment difficulties across early adolescence. *Journal of Youth and Adolescence*, 42(6), 905–920.  
<https://doi.org/10.1007/s10964-012-9806-3>
- CBS (2019) *Multiproblematiek particuliere huishoudens 2016* <https://www.cbs.nl/nl-nl/maatwerk/2019/51/multiproblematiek-van-particuliere-huishoudens-2016>
- Creswell, J. D., Dutcher, J. M., Klein, W. M., Harris, P. R., & Levine, J. M. (2013). Self-affirmation improves problem solving under stress. *PloS one*, 8(5).
- Guyatt, G. H., Oxman, A. D., Vist, G. E., Kunz, R., Falck-Ytter, Y., Alonso-Coello, P., & Schünemann, H. J. (2008). GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *Bmj*, 336(7650), 924-926.
- Ghesquière, P. (1993). *Multi-problem gezinnen: problematische hulpverleningssituaties in perspectief*. Garant.
- Heneghan, C. & Badenoch, D. (2006) Evidence-Based Medicine Toolkit, 2nd Ed. Wiley Blackwell.
- Maggi, S., Irwin, L. J., Siddiqi, A., & Hertzman, C. (2010). The social determinants of early child development: an overview. *Journal of paediatrics and child health*, 46(11), 627-635.
- Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty impedes cognitive function. *science*, 341(6149), 976-980.
- Ministeries SZW, VWS, BZK en JenV (2019). Eindrapport verkenning regeling maatwerk multiprobleem huishoudens
- Molema, H., van Erk, M., van Winkelhof, M., van't Land, K., & Kieft-de Jong, J. (2019). Wetenschappelijk bewijs leefstijlgeneeskunde. Lifestyle4Health
- Morris, K. (2013). Troubled families: vulnerable families' experiences of multiple service use. *Child & Family Social Work*, 18(2), 198-206.
- Steege, M. & Zoon, M. (NVO, BPSW en NIP) (2015). Richtlijn Multiprobleemgezinnen voor jeugdhulp en jeugdbescherming / onderbouwing .
- Rijksinstituut voor Volksgezondheid en Milieu. (2018). Synthese | Leefstijl en omgeving <https://www.vtv2018.nl/leefstijl-en-omgeving> accessed: 28-02-2020
- Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy sciences*, 4(2), 155-169.
- Steketee, M., Vandenbroucke, M. (2010) Typologie voor een strategische aanpak van multiprobleemgezinnen in Rotterdam. Verwey-Jonker Instituut. Utrecht
- Spratt, T. (2012). Why multiples matter: Reconceptualising the population referred to child and family social workers. *British Journal of Social Work*, 42(8), 1574–1591. <https://doi.org/10.1093/bjsw/bcr165>
- Tausendfreund, T., Knot-Dickscheit, J., Schulze, G. C., Knorth, E. J., & Grietens, H. (2016). Families in multi-problem situations: backgrounds, characteristics, and care services. *Child & Youth Services*, 37(1), 4-22.

## **Conference proceeding off the 38th ICSDS, Bergen, Norway 2020**

Tausendfreund, T., Knot-Dickscheit, J., & Knorth, E. J. (2017). Gezinnen in multiprobleemsituaties. In J. D. van der Ploeg (editor), *Jonge onderzoekers over de jeugdzorg: Enkele problemen uitgelicht* (blz. 11-22). [1] Amsterdam: SWP Uitgeverij.

Veldhuis, G. A., van Scheepstal, P., Rouwette, E., & Logtens, T. (2015). Collaborative problem structuring using MARVEL. *EURO Journal on Decision Processes*, 3(3-4), 249-273.

Vennix, J. A. (1996). *Group model building* (pp. 97-99). Chichester.

Weijters, G., Rokven, J.J., Verweij, S. (2018) Monitor nazorg (ex-)gedetineerden - meting 5. WODC. Den Haag.

World Health Organization. (1999). *Healthy living: what is a healthy lifestyle?* (No. EUR/ICP/LVNG 01 07 02). Copenhagen: WHO Regional Office for Europe.