

**Pronoun Use as a Linguistic Representation of Agency and
Communion in a Life-review Intervention for People With
Mild Depression**

Philine Müller
University of Twente

Faculty of Behavioural Sciences,
Master Positive Psychology and Technology,
Master's thesis, 18 July 2017
Mentors: W. A. C. Smink, MSc. and Dr. A. M. Sools

Abstract

Introduction. In Psychotherapy Process Research (PPR) recent developments strive towards an assessment of the natural language in order to review the process and changes over the course of therapy. The use of function words, like pronouns (first person singular and plural), is considered a linguistic representation of agency and communion, and does as well reflect one's mental health, e.g. depression and well-being. Agency and communion are common factors, overarching over different therapy approaches, relevant within the therapeutic process and associated with an improvement in depression. With respect to their linguistic representations however, contractions are found. The use of first person singular pronouns and depression are negatively correlated, while agency, considered an important factor in the convalescence of depression, is positively associated with the use of first person singular pronouns. This study aims at investigating the syntactical representations of agency and communion, over the course of a narrative e-mail supported intervention, in relation to changes in mental health, e.g. depression and well-being.

Method. Textual data from e-mail conversations between participant and counsellor, and questionnaire data of the participants' mental health are derived from the intervention 'Op Verhaal Komen' (OVK). By the means of text-mining, using the parsing program GrETEL, the participants' pronoun use is quantified. Repeated measures ANOVAs are used to analyse the change in depression, well-being, and pronoun use. Further, binary logistic regressions are conducted for participants with a strong and small improvement in depression, in order to find relationships between the change in syntax use and mental health. A MANOVA was used to detect the expected association between gender and syntax use.

Results. While mental health improved, also the use of first person singular pronouns significantly increased and the use of first person plural pronouns decreased. However, no

relation between the use of pronouns and mental health, and no association between gender and syntax use could be found.

Conclusion. A significant change in the use of the syntax was found, parallel to an improvement in depression and well-being, however no relationships between these findings are detected. This gives reason to pursue further investigation of pronoun use in the context of agency, communion and depression. Furthermore, some limitations of the study and criteria important to future research are discussed.

Index

Abstract	2
1 Introduction	5
1.1 Agency and Communion: Important Common Factors in Psychotherapy.....	7
1.2 Text-based Methods in Psychotherapy Process Research	11
1.2.1 Developments in Research Towards Text-based Methods.....	11
1.2.2 Text-based Assessment of Mental Health and Common Factors.....	13
1.3 Research Questions and Hypotheses	16
2 Method	19
2.1 Procedure and Data Collection	19
2.2 Instruments	21
2.2.1 Intervention.....	21
2.2.2 Questionnaires.....	22
2.2.3 Software.....	23
2.3 Participants	24
2.4 Analysis	25
2.4.1 Data Preparation.....	25
2.4.2 Data Analysis.....	27
3 Results	29
3.1 Statistics and Developments for the Overall Study Population.....	29
3.2 Sample Divided by Strong / Small Improvement in Depression.....	31
3.3 Sample Divided by Male and Female Participants.....	33
4 Discussion	34
4.1 Limitations and Strengths	37
4.2 Recommendations	40
4.3 Conclusion	41
References	42
Tables, Plots and Figures	46

Pronoun Use as a Linguistic Representation of Agency and Communion in a Life-review Intervention for People with Mild Depression

1 Introduction

In psychotherapy, there are growing attempts to develop evidence-based treatments, which are scientifically tested for their effectiveness, in order to improve therapeutic outcomes and efficiency of care (Bloom & Tam, 2015; Hill & Corbett, 1993). Research on psychotherapy is concerned with the outcome of treatments and their process as well. Outcome research aims at investigating the effectivity of psychotherapeutic approaches, and therefore assesses the pre- and post-therapeutic measurements to review change as a result of the psychotherapeutic intervention (Hill & Corbett, 1993), mostly by using control conditions (Knobloch-Fedders, Elkin, & Kiesler, 2015). Psychotherapy Process Research (PPR) concentrates on the in-session events and mechanisms “in terms of therapist behaviors, client behaviors, and the interaction between therapists and clients” (Hill & Corbett, 1993, p. 3; Knobloch-Fedders, et al., 2015). Hill and Corbett (1993) however propose the integration of findings regarding process and outcome as an improvement in psychotherapy research. Pretherapy characteristics of the client, process variables, and outcome measures should be linked in order to assess the efficacy and the specific working mechanisms in therapeutic approaches. This so-called *Process-Outcome Research* is essentially the search for therapeutic and working ingredients in psychotherapy (Stiles & Shapiro, 1989).

With regard to working mechanisms in therapy, Rosenzweig (1936) and other researchers (see Grencavage & Norcross, 1990) are convinced that neither the theoretic background, nor the specific features of psychotherapeutic treatments seem to be the working factors in therapy. Moreover, aspects concerning the interaction between client and therapist,

and hence the process of psychotherapy itself, might be more important for initiating change. Factors like therapeutic alliance, catharsis, client's positive expectancies, and several more (Grencavage & Norcross, 1990) are assumed to be independent of the type of therapeutic approach applied and are therefore classified as 'pan-theoretical' (Braakman, 2015; Messer & Wampold, 2002). These so-called *common factors* are associated with therapeutic success more generally (Ahn & Wampold, 2001; Braakmann, 2015; Kazdin, 2009). For example, research revealed that effective therapists incorporate common factors more successfully during therapy and the presence of common factors within therapy can differentiate between successful and unsuccessful treatments (Braakmann, 2015).

Two common factors, agency and communion, are found to be important in therapy, especially in the context of the convalescence of depression. Agency describes people's ability to take the lead over the course of their own life and act self-determined (Adler, 2012). Communion on the other hand represents one's concern with the affiliation to other people and groups (Helgeson, 1994). Both features, the focus on the self and the connection with others, are essential within a human being and crucial in order to maintain mental and physical health (Bruch, 2002; Buss, 1990; Helgeson, 1994).

An essential question in psychotherapy research is how interaction processes between client and therapist can be captured in an appropriate and sufficient manner. Until recent technological developments however, there was little scientific progress concerning the assessment of the therapeutic process (Chung & Pennebaker, 2007; Stiles & Shapiro, 1989). Thanks to modern computer technology, data regarding the interaction between client and therapist can be collected and analysed more easily and efficient (Chung & Pennebaker, 2007). Computer-supported analysis-methods, like text-mining, provide the possibility to gather and analyse greater amounts of data (Imel, Steyvery, & Atkins, 2015). Furthermore, online therapy methods, like e-mail supported life-review interventions, generate textual data

directly, discarding the need for further transcriptions of the correspondence between therapist and client.

The therapeutic method *life-review*, based on narrative therapy, deals with recapitulating one's life and memories in order to evaluate important life-events and eventually look for alternative interpretations of these events (Bohlmeijer, 2007; Postel, Lammers, Westerhof, & Bohlmeijer, 2012). Especially negative life-events are being challenged, so that underlying assumptions and unrealistic thoughts can be corrected. Research has indicated the effectiveness of reminiscence and life-review in reducing depressive symptoms in elderly people (Bohlmeijer, 2007). Furthermore, life-review has a significant positive influence on psychological well-being as well. In people suffering from depression, life-stories are predominated by problematic events and victimhood and appear to be low in agency (Bohlmeijer, 2007). Assessing agency within narratives could therefore give insight in the development of depressive symptoms and well-being of an individual.

In the following paragraphs, the concepts of agency and communion will be elaborated and their implications for mental health outlined. Additionally, recent developments in Psychotherapy Process Research, text-analysis methods and technologies are summarized. Finally, the assessment of the common factors agency and communion, and mental health within the context of an e-mail supported life-review therapy will be explained and the concomitant difficulties reviewed.

1.1 Agency and Communion: Important Common Factors in Psychotherapy

According to Adler (2012), agency “is concerned with the individual's autonomy, achievement, mastery, and the ability to influence the course of his or her life” (p. 239). McAdams, et al. (2006) identified agency within life-stories based on four themes reoccurring in agentic stories: achievement/responsibility, power/impact, self-mastery, and

status/victory. Furthermore, agency is viewed as the capacity of people to “effect change in themselves and their situations through their own efforts” (Bandura, 1989, p.1175). Thus, agency is the extent to which one is able to control his or her actions and initiate changes in life autonomously (Bandura, 1989).

Research has shown that agency is strongly related to psychological well-being and has relevant implications for mental health (Adler, 2012; Helgeson, 1994). Especially in the context of depression, agency is an important construct in the sense that one’s perceived capacity of acting has an effect on the experience of anxiety and depression (Bandura, 1989). The study by Slaby, Paskaleva, and Stephan (2013) shows that people with depression have an impaired sense of their own abilities and lack agency. A deprivation in agency, caused by depression, leads to a range of negative emotions such as guilt, uselessness, isolation, and the feeling of being a burden to others, as well as negative anticipations about the future like stagnation or catastrophes (Slaby, et al., 2013). Even a relation between suicide ideation and a lack of agency in older men with depression is found, which emphasizes the importance of interventions aiming at increasing the participants’ levels of agency (Hobbs & McLaren, 2009).

Helgeson (1994) as well underlines the role agency has in the context of depression. Moreover, she addresses the concept of communion as equally necessary within a person to reduce depression. Communion refers to one’s participation in a group, cooperation, attachment, focus on others, and the ability to establish connections with others in a group (Helgeson, 1994). Similar to agency, there are reoccurring themes associated with communion: love/friendship, dialogue, caring/help, and unity/togetherness (McAdams, et al., 2006). It seems as if agency and communion describe relatively opposite concepts, as “agency reflects one’s existence as an individual, and communion reflects the participation of the individual in a larger organism of which the individual is a part” (Helgeson, 1994, p.

414). However, both factors need to be well-balanced within an individual to have beneficial implications for the person's mental health.

So-called unmitigated agency, respectively unmitigated communion, which are accordingly not attenuated by the other one, have in fact a negative influence on one's mental state and behaviour (Bruch, 2002; Buss, 1990; Helgeson, 1994). Agency taken to the extreme, when unmitigated by communion, leads to a greater focus on the self and neglect of others, whereas unmitigated communion describes an extreme focus on the community and an exclusion of the self. Therefore, unmitigated agency is negatively correlated with communion and vice versa unmitigated communion has a negative relationship with agency (Bruch, 2002; Helgeson, 1994). Both extremes of agency and communion have a negative impact on one's mental and even physical health, by being associated with negative affect, depression, poor health behaviour, and a lack of psychological well-being (Bruch, 2002; Buss, 1990; Helgeson, 1994). Although agency and communion are ideally mitigated by the other one, the constructs are still empirically unrelated and are therefore considered two distinct but essential factors within the human-being (Helgeson, 1994; Saragovi, Koestner, Di Dio, & Aubé, 1997).

Additionally, the concepts of agency and communion seem to be closely related to gender. It appears that females display significantly more communal behaviour and attitudes in comparison to men, which are associated with a more agentic character (Helgeson, 1994; Saragovi, et al., 1997). This deficiency in agency makes women more vulnerable for depression and can be an explanation for the 2:1 ratio of women and men suffering from depression (Bruch, 2002). Men on the other hand are more likely to exhibit poorer health behaviour and are therefore more prone to physical illness (Helgeson, 1994). Also, male and female role behaviours are found to be related to agentic and communal traits to such an extent, that these constructs should rather be measured by questionnaires assessing personal

attributes or sex roles, like the Personal Attributes Questionnaire (PAQ) or the Bern Sex Role Inventory (BSRI) (Helgeson, 1994; Saragovi, et al., 1997). In sum, agency and communion are both essential concepts regarding the presence of well-being and the absence of depression (Bruch, 2002; Buss, 1990; Helgeson, 1994; Saragovi, et al., 1997). Mainly agency, mitigated by communion, is a factor which contributes to mental health and especially to low levels of depression (Helgeson, 1994).

Given the impact of agency and communion on mental health factors like depression and well-being, there are several studies conducted concentrating on the role agency has within the process of psychotherapy, especially in the context of narrative psychotherapeutic approaches (Etchison & Kleist, 2000). Adler's (2012) research is focused on the development of one's agency within the narrative identity over the course of a therapeutic process. He claims that narrators, who display a more agentic way of narrating have more impact on their own lives, the ability to initiate changes and control over the course of the narrative (Adler, 2012). A central outcome of Adler's research (2012) is that agency increases over the course of a 12-week psychotherapeutic intervention and is in this context positively related to mental health. Similar to these findings, McAdams, et al. (2006), had already assessed the development of basic features in life-stories over time. They looked closer into themes like the emotional tone of the narratives, the complexity of the narrative, and motivational aspects like agency, and examined the change in these themes over the span of three years. Thereby, they were able to demonstrate the stability of agency in healthy individuals within the narrative identity. Additionally, he found a correlation between agency and personal growth as well as a positive association between agency and emotional tone, demonstrating the importance of agency within an individual (McAdams, et al., 2006). Concerning future research on these issues, the research group emphasised the need for further longitudinal studies assessing the narrative identity and indicated the potential of narrative personality

research compared to more traditional research methods, like self-reports (McAdams, et al., 2006).

1.2 Text-based Methods in Psychotherapy Process Research

1.2.1 Developments in Research Towards Text-based Methods.

Already in the early beginnings of Psychotherapy Process Research, audio recordings of real therapy sessions were used to gain deeper insight into the therapeutic process (Braakmann, 2015; Hill & Corbett, 1993; Imel, et al., 2015; Wallerstein, 2001). At first, mainly client and therapist variables were assessed and related to outcome measures. Later, an interest in finding more components of the therapeutic process developed and the role of language use during therapy became a topic of PPR (Braakmann, 2015). Imel, et al. (2015) stress the fact that verbal exchange during the client-therapist interaction is the quintessence of psychotherapy. Knowledge about communicational patterns, meaning what and especially how it is said, can have positive implications for communication in therapy and the outcome of therapy (Howes, Purver, & McCabe, 2014). Therefore, the focus on language usage can give insights into important within-person processes, like agency (Ahern, 2001).

However, the focus in PPR has not yet shifted to assessing raw linguistic data and is still mostly concerned with client and therapist self-reports or behavioural measures coded by researchers, although this way of retrieving data holds several disadvantages: For example the range of possible responses in self-reports is restricted for the participants (Arntz, Hawke, Bamelis, Spinhoven, & Molendijk, 2012), the process of coding verbal interactions is very time-consuming and the reliability can be limited in some cases (Imel, et al., 2015). Furthermore, by the means of human coding only a certain amount of data can be analysed (Imel, et al., 2015). Therefore, the analysis of textual data by human coders is “slow, complex, and costly” (Chung & Pennebaker, 2007, p. 343).

Gelo, Salcuni, and Colli (2012) state that PPR should nonetheless be performed via the use of textual material consisting of linguistic data, acquired for example from therapeutic sessions. However, considering the volume of linguistic data gathered from actual therapy sessions, analysis can only be accomplished by the means of a computer-performed analysis system, such as text-mining. This is eventually possible since recent developments in data-mining technologies (Chung & Pennebaker, 2007; Imel, et al., 2015). Yet, there is little literature available regarding the utility of computational linguistics in psychotherapy research (Imel, et al., 2015).

Text-mining describes “the process of extracting [...] patterns or knowledge from unstructured text documents” (Tan, 1999, p. 65). In other words, software programs are used in order to extract linguistic information or patterns from textual data. This process consists of two stages: First of all, a text is refined and transformed by a parsing program into a so-called *intermediate form*. This means that the textual data is structured automatically by the software, by categorizing the text syntactically and tagging every element in a sentence (Bouma, van Noord, & Malouf, 2001; Tan, 1999). This can be done by creating parsing trees (see Figure 1; Meyers, 2014), a diagram which reveals the dependency of all categorized parts of a sentence (Bouma, et al., 2001). As visible in Figure 1, all parts of the sentence are tagged according to their syntactical function, e.g. ‘*the*’ is the article to the noun ‘*rat*’, ‘*ate*’ is the verb of the sentence, and so on and so forth, and organized into a diagram. The second step is the *knowledge distillation*, where patterns or knowledge are deduced from the intermediate form, consisting of the categorized and tagged textual data (Tan, 1999). This way, semantic as well as syntactical information and sequences can be mined and patterns in language use identified (Bouma, et al., 2001).

1.2.2 Text-based Assessment of Mental Health and Common Factors.

Psychotherapy Process Research seems to be progressively oriented towards studying the linguistic elements of the psychotherapeutic processes. Chung and Pennebaker (2007) for instance state that speech is one of the biggest parts of social interactions, but there is still little research done with respect to natural language in the social sciences, especially in psychology. The assessment of language use during psychotherapy can be accomplished by two different approaches (Tausczik & Pennebaker, 2010). Some researchers are focused on the content of speech (cf. Adler, 2012; McAdams, et al., 2006; Tromp, 2011), whereas others investigate the syntax used during therapy (cf. Chung & Pennebaker, 2007). Accordingly, Tausczik and Pennebaker (2010) composed two categories in order to classify words: On one hand *content words*, like nouns, verbs, adjectives, and adverbs, transfer the meaning one wants to communicate. On the other hand, *function words*, like pronouns, prepositions, articles, and conjunctions, reflect one's style of speaking and are therefore assumed to be closer related to the social and psychological state. These function words are relatively independent to the content of the sentence and make up more than 50% of the words used in spoken language. Also, the use of function words in language is relatively unconscious and uncontrolled. They are therefore discussed as non-reactive indicators of personal style and personality (Chung & Pennebaker, 2007), and their use can be related to one's mental and physical health (Garcia, Ankarsäter, Kjell, Archer, Rosenberg, Cloninger, & Sikström, 2015).

There are however some research projects conducted, focussing on the use of language in the context of mental health, and agency and communion of the psychotherapeutic process:

Mental Health. First attempts were made by Weintraub in 1981 and 1989 (see Tausczik & Pennebaker, 2010) to assess function words in order to investigate mental health states, whereby he found a significant relationship between the use of first person singular

pronouns and depression. More recently, it was indicated that currently depressed students make significantly more use of first person singular pronouns than their peers (Rude, Gortner, & Pennebaker, 2004). Similarly, an increased usage of first person singular pronouns by depressed individuals on social media could be found (De Choudhury, Gamon, Counts, & Horvitz, 2013). Arntz, et al. (2012) based their research on the fact that several psychological processes and psychological change are represented by one's use of words and way of speaking. Here, they could confirm the hypothesis that a decreasing use of first-person singular pronouns in life-stories is associated with a reduction of general and depressive symptoms and is accompanied by a shift away from a pronounced self-focus (Arntz, et al., 2012).

Agency and Communion. Street, Makoul, Arora, and Epstein (2009) linked client-therapist communication to measures of health and discovered that some reoccurring factors within communication can enhance a positive treatment outcome. One of these factors is agency, which is found to be associated with clients who display an active attitude and role during treatment. Moreover, agency appears to be represented by the language used within therapy, similar to mental health states. Tromp (2011), whose project evolved around life-stories and the language used within life-stories, was expecting an increase in the use of first-person singular pronouns in order to show a gain in agency. Despite the fact that he could not find any changes regarding first-person singular pronouns, there are several theories supporting the idea that agency is linked to a greater use of first-person singular pronouns. For example, Dixon's animacy hierarchy (Dixon, 1994, cited by Ahearn, 2001), which describes a spectrum of syntactical language constructs according to their association with agency, suggests that a more frequent use of first-person singular pronouns is characteristic for agentic speech (Ahearn, 2001). In a research project concerned with linguistic markers of psychological traits and emotions in song lyrics, first person singular pronouns serve as an

indicator for agentic traits and first person plural pronouns were defined as a representation of communion (DeWall, Pond, Campbell, and Twenge, 2011), which is equivalent to the idea of McAdams (1993). Therefore, the constructs of agency and communion are supposed to be linguistically represented by pronouns. Agency should mainly be accompanied by a greater use of first person singular pronouns (Ahearn, 2001; Tromp, 2011), and communion by the use of first person plural pronouns (DeWall, et al., 2011; McAdams, 1993).

All in all, it appears that mental health states, common factors, and their developments are mirrored by language and linguistically represented especially by function words, e.g. pronouns. Nevertheless, the field of computational linguistics in the context of psychological sciences is still in its infancy (cf. Chung & Pennebaker, 2007; Imel, et al., 2015) and therefore some contradictory findings are after all undisclosed: As indicated by Chung and Pennebaker (2007), Rude, et al. (2004), De Choudhury, et al. (2013), and Arntz, et al. (2012), depression is associated with an increased use of first person singular pronouns and a decline in depressive symptoms is also linked to a reduced usage of first person singular pronouns. Agency on the other hand is connected to a more frequent use of first person singular pronouns (Ahearn, 2001; Tromp, 2011). Hence, both constructs, depression and agency, are operationalized by the same linguistic indicator (first person singular pronouns), but are negatively correlated. Therefore, an increase in agency is associated with a decrease in depression, whereas higher levels of agency are associated with an increase in first person singular pronouns. However, a decline in depression is contrarily linked to a decrease in the use of first person singular pronouns (see Figure 2). In contrast to prevailing theory, Garcia, et al. (2015) therefore state that first person singular pronouns should be negatively correlated with agency in personal life-stories, but could not provide any empirical evidence for that claim.

Communion on the other hand is also perceived as an essential factor in the context of agency and the decrease of depression (Bruch, 2002; Buss, 1990; Helgeson, 1994), and is supposed to be linguistically represented by first person plural pronouns (DeWall, et al., 2011; McAdams, 1993). Even though agency and communion have different linguistic representations, does not mean that they are also incompatible in the proposed model (Figure 2). Agency and communion are not considered related factors or correlational, but understood as two distinct entities (Helgeson, 1994; Saragovi, et al., 1997). This means that the two factors agency and communion, as well as the use of their linguistic representations, can alternate independently within an individual (see Figure 3).

It becomes apparent that there are still some inconsistencies and contradictions regarding linguistics within psychotherapy research, especially regarding the presented dilemma (see Figure 3) between agency, depression and their linguistic representations.

1.3 Research Questions and Hypotheses

As seen in the previously presented studies (see Ahearn, 2001; Arntz, et al., 2012; Tromp, 2011), the extent to which someone is mentally healthy and expresses personal traits, like agency and communion, seems to be mirrored by his / her use of first person pronouns. Also, these common factors, agency and communion, are linked to gender. Most studies, as conducted by Adler (2012), focus yet on the content and semantic aspects of language and make use of human coders. Especially in the field of psychotherapeutic changes in client's personal narratives, research is still mainly based on small-scale qualitative projects (Adler, 2012). Complementary to earlier research, this study will examine the syntactical representations of agency and communion, in conjunction with the improvement of mental health by the means of a narrative e-mail supported therapy. As earlier mentioned, technical developments in the field of natural language processing, like text-mining, enable researchers

to review greater amounts of data (Chung & Pennebaker, 2007; Imel, et al., 2015) and analyse on a structural or syntactical level (Bouma, et al., 2001).

In this thesis, the new technological possibilities in computational linguistics and the concentration on language in psychotherapy process research are conjoined. The question will be examined, whether analysing personal narratives from a narrative e-mail supported intervention by using text-mining technologies can give insights if and how a change in agency and communion, represented by syntactical features, is linked to therapy outcome for people with depressive symptoms, and asks:

How does the use of the syntactical representations of agency (1st person singular pronouns, ik) and communion (1st person plural pronouns, we/wij) develop over the course of a narrative e-mail supported intervention; and is this development related to an increase or decrease in depression or well-being?

This question can be operationalized by several subquestions and hypotheses, divided by three themes:

1. *Developments of the overall study population*

- a) Are the levels of depression and well-being significantly changed over the course of the intervention?

Hypothesis: There are significant decreases in the levels of depression and significant increases in the levels of well-being expected.

- b) Does the use of first person singular pronouns (ik), and the use of first person plural pronouns (we/wij), significantly increase or decrease over the course of the intervention?

Hypothesis: Regarding the use of first person singular pronouns, as an operationalization of agency, a significant increase is expected. With respect to the

first person plural pronouns a significant increase is expected, which will be interpreted as an increase in the levels of communion.

- c) How are the constructs depression, well-being, first person singular pronouns, and first person plural pronouns related at the beginning (t_1) and at the end (t_7) of the intervention.

Hypothesis: There is a significant negative relation expected between depression and well-being. There is no relationship between first person singular and plural pronouns, interpreted as linguistic representations of agency and communion. Furthermore, there is a relationship expected between the use of first person pronouns and depression.

- d) Is there an interaction effect of the participants' change in mental health, measured by depression and well-being, on the change in the use of first person singular pronouns? Is there an interaction effect of the participants' change in mental health, measured by depression and well-being, on the change in the use of first person plural pronouns?

Hypothesis: There are interactions of the change in the levels of depression and well-being on the change in the use of first person singular / plural pronouns.

2. *Sample divided by strong or small improvement in depression*

- a) Does the grouping-variable '*strong improvement / small improvement*' discriminate significantly between participants who had a strong / small improvement in depression?

Hypothesis: The variable *strong / small improvement* is expected to be sufficiently discriminative and there are significant differences in the two groups with respect to the levels of depression.

- b) Does a change in the syntax used (amount of first person singular, respectively plural pronouns) from t_1 to t_7 predict the membership of the *strong improvement-* / *small improvement-*group in depression, divided by the median?

Hypothesis: A change in the use of the syntax is expected to predict the membership of the participants to the *strong* respectively *small improvement* in depression group.

3. *Sample divided by gender*

- a) Are there significant differences in the use of pronouns (first person singular / plural pronouns) in male and female participants, resembling higher levels of agency in male participants and higher levels of communion in female participants?

Hypothesis: Female participants make significantly more use of first person plural pronouns, whereas male participants make significantly more use of first person singular pronouns.

2 Method

2.1 Procedure and Data Collection

The data examined in this thesis is derived from the intervention ‘Op Verhaal Komen’ (OVK) (Lamers, Bohlmeijer, Korte, & Westerhof, 2015), an e-mail supported intervention, which is based on life-review techniques and directed at people suffering from mild depressive symptoms. Besides demographic measures, two different kinds of data were collected during the intervention period: Firstly, the textual data was gathered from the e-mail correspondence between client and counsellor. Secondly questionnaire data was assessed in order to examine the effectiveness of OVK on depressive symptoms and well-being. Both

kinds of data were collected by Lamers, et al. (2015) for an investigation of the effectiveness of the intervention OVK.

The textual data was collected during the intervention OVK and consists of e-mail conversations between the counsellor and the participants, and the participants' answers to the life-story exercises of OVK. After the texts were prepared for further analysis (in detail see paragraph 2.4.1), the syntactical data from these texts was gathered by the means of text-mining. The outcome measurements of the intervention were retrieved using questionnaires (Centre for Epidemiological Studies Depression Scale (CES-D, Radloff, 1977; Bouma, Ranchor, Sanderman, & van Sonderen, 1995) and Mental Health Continuum Short Form (MHC-SF, Keyes, Wissing, Potgieter, Temane, Kruger, & van Rooy, 2008; Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011)), along with questions about the participants' demographic data, before and after the intervention period.

Prior to the study, participants received a screening questionnaire, composed of questions regarding demographics and the CES-D. Furthermore, they were interviewed via telephone, according to the Mini International Neuropsychiatric Interview (MINI; van Vliet & de Beurs, 2007, cited by Lamers, et al., 2015), in order to determine depressive symptoms and suitability of the participants to take part in OVK. Then, still prior to the intervention, the baseline measurements (0A and 0B) of the MHC-SF were collected. Posterior to the intervention period, the measures of the CES and the MHC-SF were repeated (see Table 1): (1) directly after the OVK intervention (three months after the baseline measurements); (2) then again three months after completing the intervention, accordingly six months after the baseline measurement; (3) and finally nine months succeeding the intervention, which is equivalent to twelve months after the intervention ended (see Table 1). In the present work, the quantitative measurements of interest are the collected data of the CES-D, the MHC-SF, and the participants' demographics, which will be further elaborated.

2.2 Instruments

2.2.1 Intervention.

The intervention ‘Op Verhaal Komen’, conducted by the University of Twente in 2012, is originally based on a self-help book, using integrated reminiscence and life-review techniques in order to alleviate depressive symptoms (Postel, et al., 2012). OVK consisted of eight exercises and was conducted over a period of ten weeks, with a three-week phase-out period. The intervention was conceptualized for middle aged and older people, suffering for mild to moderate depression.

The participants of the intervention were separated into three sub-groups and textual data was collected from two of them either using live-review with e-mail guidance or expressive writing with e-mail guidance. The third group represented a waiting-list group with no treatment. Both experimental groups, live-review and expressive writing with e-mail guidance, were included into this study in order to assess the use of pronouns in the context of mental health, independent of the form of treatment. The waiting-list group could not be integrated, because there is no textual data collected from these participants. During the intervention participants of both conditions (live-review and expressive writing) had to complete writing-exercises at home regarding personal narratives. These were sent to the counsellor every week via e-mail and in return the counsellor responded with questions and psychological support. The goal of the writing exercises was to identify life-stories underlying to the depressive symptoms and re-evaluate these memories.

The content of the exercises differed in the two experimental conditions, life-review and expressive writing. The first modules of the life-review condition concerned topics like childhood, love, family, and friendship. The exercises towards the end of the intervention addressed issues of the near future of the participants. Regarding expressive writing, participants received in the first module exercises about negative experiences. In the last

week of the intervention they were asked to write a letter to a personally meaningful person (Lamers, et al., 2015). Because the present study is concerned with the syntactical features of the narratives and less with the content or semantics of the personal stories, the content of the exercises is not further elaborated. More information about the intervention and its content can be obtained from Lamers, et al. (2015).

2.2.2 Questionnaires.

Depressive Symptoms. The Centre for Epidemiological Studies Depression Scale (CES-D, Radloff, 1977) is a questionnaire designed to assess depressive symptoms in a population, for example to identify high-risk groups. It consists of 20 items, with 16 negatively and four positively phrased. The American version of the questionnaire describes four sub-scales: *somatic-retarded activity*, *depressed affect*, *positive affect* and *interpersonal affect*. The questionnaire is reviewed by the COTAN in 1995 and is evaluated as sufficient for usage in clinical trials (Nederlands Jeugdinstituut, n.d.).

Well-being. The three dimensions of well-being, emotional, psychological, and social well-being, were assessed using the Mental Health Continuum Short Form (MHC-SF, Keyes, et al., 2008). It consists of 14 items, scored on a 6-point Likert scale, and measures well-being in respect to the past month. The questionnaire has, according to the evaluation of Lamers, et al., (2011), good statistical properties, including a good internal reliability and convergent and divergent validity. It is therefore a valid and reliable instrument for clinical trials (Lamers, et al., 2011).

2.2.3 Software.

The text-mining software GrETEL 2.0 was used to analyse the textual data and extract the syntactical features of the texts in this study. Furthermore, SPSS 21 was used for the statistical analyses.

GrETEL 2.0 + GrETEL-upload. For the analysis of the syntactical features of the life-stories from ‘Op Verhaal Komen’ the GrETEL parser (Greedy Extraction of Trees for Empirical Linguistics) was utilized. GrETEL provides a dependency parser developed for applied researchers unfamiliar with text-mining software (Augustinus, Vandeghinste, & Van Eynde, 2012), which is used in order to reveal the syntactical function of words within a sentence. GrETEL was originally developed as a search engine for only online available Dutch treebanks, namely Lassy Small, Corpus Gesproken Nederlands (CGN) Treebank, and SoNaR Treebank, which are text corpi already parsed and transferred into the intermediate form and online available for further analysis. There, an analysis of own content was not possible. The latest version of GrETEL however, GrETEL 2.0 + GrETEL-upload (van der Klis & Odijk, 2017), allows an upload of an own dataset and makes analysis of any content possible. There are mainly computational analysis programs available for the English language (Bouma, et al., 2001) and only a few Dutch software packages accessible with an upload-function for an own dataset.

When the data is uploaded in GrETEL 2.0 + GrETEL-upload, it is processed and parsed with the Alpino parser, which is a computational analyser for Dutch language (Bouma, et al., 2001), and pars trees (see Figure 1 for an example) of the data are generated. Alpino thus tags the elements within a sentence and transforms the plain text into the intermediate form (Bouma, et al., 2001; Tan, 1999). Using GrETEL the data can be further analysed and the second step of the text-mining process, the knowledge distillation (Tan, 1999), can be performed. The deduction of linguistic patterns within GrETEL can be done

either via inserting a self-written parsing algorithm or by inserting an example sentence representing the targeted syntactical construction. The programming language used by GrETEL is XPath. Consequently, when inserting a self-written parsing algorithm, this command must be an XPath query. When using the example-based search, a pars tree of the example sentence is generated by GrETEL. Then, target syntactical constructions of the sentence can be selected within a matrix and GrETEL transfers this into an analogous XPath query. The uploaded dataset can then be analysed, based on the example sentence (Augustinus, Schuurman, Vandeghinste, & Van Eynde, 2014).

2.3 Participants

The participants had to meet several criteria, in order to be included into the intervention. The OVK intervention was developed for middle-aged and older participants (> 40 years). Furthermore, a minimum score of 10 on the CES-D was required, indicating mild to moderate depressive symptoms, and there must be no depressive disorder or suicidality be present in the participants according to the answers on the MINI.

Originally, 116 participants were assigned to the experimental conditions (Lamers, et al., 2015). In the current study, only cases were included that completed minimal 50% of the exercises of OVK. After exclusion of insufficient cases from sample, the current study population consisted of 67 participants ($N = 67$) and had an average age of 58.46 years ($SD = 8.9$). The minimum age of the participants was 42 years and the maximum was 80 years. The population consisted of 14 males, with an average age of 59.43 years ($SD = 11.26$; age range: 44-79), and 53 females, with an average age of 58.21 years ($SD = 8.27$; age range: 42-80) (see Table 1).

2.4 Analysis

2.4.1 Data Preparation.

After obtaining the data from the research project of Lamers, et al. (2015), both types of data, the textual data and the quantitative outcome measures, were prepared for further analysis. Only the data of the first and of the last week of the intervention are of interest in the context of this study, as the change the participants had accomplished over the course of the whole intervention was reviewed. First of all, the participants' response-rate for all eight exercises was assessed. Data from participants who completed less than 50% of the exercises was not considered sufficient and was therefore excluded from further analyses, leaving the 67 participants described in the paragraph above. Afterwards, based on these participants, the overall response for the exercises was determined (Table 3). Due to the fact that the last exercise in week eight was only completed by 37.7% of the 67 participants, this exercise was excluded from further analyses. Therefore, the participants' change on the exercises from week 1 (t_1) to week 7 (t_7) was assessed in this study.

Textual data. In order to prepare the texts of exercise 1 and 7 for analysis with the parsing software GrETEL 2.0 + GrETEL-upload, the textual data was transformed into several data sets containing only the data of interest for this study. E-mails about the organization of the course or other issues unrelated to the exercises of OVK were not included into the analysis. Also, the introductory mails of the counsellor and the clients were left out of the data. The text fragments left, meaning only the answers to the exercises of OVK of week 1 (t_1) and 7(t_7), were sorted into text files per participant. Furthermore, the spelling in these documents was corrected to make the words detectable for the GrETEL 2.0 + GrETEL-upload parser. This was done by using Microsoft Word 2016. Only mistakes marked by the software program as spelling errors were corrected, according to the program's suggestion. This function of Microsoft Word 2016 was used in order to keep objectivity in

the process of making adjustments in the original texts. Therefore, no profound changes were applied to the content of the texts. For the upload of the textual data to the GrETEL parser, the documents were converted into plain text files with a UTF-8 coding and were then transferred to a ZIP-folder.

Questionnaires. The quantitative measures regarding the levels of depression and well-being of the participants were obtained in a SPSS document and no further preparation was needed. For a classification of the participants' improvement, based on the levels of depression at t_1 and t_7 (see research question 2), the median of the scores on the depression scale CES-D was used. The delta-variable, and therefore the change in the level of depression from t_1 to t_7 was computed. Then the median of this delta-variable was determined and used in order to divide the population into *strong* and *small improvement* in depression, over the course of the intervention.

Missing Data. The response on exercises 7 was 88.1% resulting in eight uncompleted exercises and missing data (Table 3). For the data of the CES-D and the MHC-SF on the post-intervention measurement (t_7) 3.0% of the data was missing, accordingly two missing cases (Table 3). The measurements of the questionnaires prior to the intervention (t_1) had a response-rate of 100%. The missing data at t_7 was imputed by the means of Expectation Maximization (EM) in SPSS (Dempster, Laird, & Rubin, 1977), as used comparably in Lamers, et al. (2015). In order to conduct an imputation, the randomness of the missing values had to be affirmed. There were no correlations, or significant t-test results between the variables found and the missing values could be imputed.

Text-mining. Using the GrETEL 2.0 + GrETEL-upload parser the textual data was quantified and manually transferred to SPSS to conduct further analyses. The algorithms used for the text-mining analyses were written in the programming language XPath (appendix A). Several measures were taken from the textual data per participant of exercise 1 (t_1) and 7 (t_7):

(1) the number of words per exercise, (2) the amount of first person singular pronouns ('ik') and (3) first person plural pronouns ('we/wij') used. Only the nominative case of the Dutch first person pronouns ('ik', 'we/wij') was assessed, because any other cases, e.g. accusative ('me/mij', 'ons'), imply that the narrating person is not the subject of the sentence and therefore refers to a different agent. The Dutch example sentence '*Zij/ Hij spreekt met me/mij / ons.*' (*He / She is talking to me / us.*) shows, that when the pronouns 'me/mij' or 'ons' are used, the agent in the sentence is generally not the person narrating. An average use of first person singular and plural pronouns per person per exercise is estimated by the division of the amount of singular, respectively plural pronouns used, and the number of words per exercises. The estimation of the average is done in relation to the amount of words per exercise, because a word is defined as an entity and in the parsing program always registered as such. A sentence for example can be unfinished or ambiguous and therefore not properly detected by the parser.

2.4.2 Data Analysis.

As the research question is divided by three themes, the analyses are as well organized by:

- (1) Developments of the overall study population
- (2) Sample divided by *strong improvement / small improvement* in depression
- (3) Sample divided by gender

(1) Developments of the Overall Study Population. To review the development of the participants' development in depressive symptoms, well-being, and the use of first person singular and plural pronouns, a repeated measures ANOVA from t_1 to t_7 was conducted for all four variables (CES-D, MHC-SF, average use of first person singular pronouns, and average use of first person plural pronouns). The effect size of the analysis is determined by the partial eta squared (η_p^2) and is defined by Cohen (1988, in Eid, Gollwitzer, & Schmitt,

2015) as: $\eta_p^2 \approx .01$ is a small effect, $\eta_p^2 \approx .06$ describes a medium effect, and $\eta_p^2 \approx .14$ stands for a great effect. Furthermore, the relation between these measures at the pre- and post-test was assessed by the use of a Pearson correlation, where a coefficient of $r \approx .1$ describes a small correlation, $r \approx .3$ a moderate and $r > .5$ is interpreted as a strong correlation (Sedlmeier & Renkewitz, 2013). Finally, to assess an interaction between the change in depression and well-being and use of first person singular, respectively, the use of plural pronouns was determined. Therefore, multiple regressions were conducted with the delta-variable of depression and well-being, as the independent variables and the delta-variable of the first person singular, respectively plural pronouns as the dependent variable.

(2) Sample Divided by Strong Improvement / Small Improvement in Depression.

Previous to any analyses, the discriminative value of the grouping variable ‘improvement in depression’ was assessed. A repeated measures ANOVA of the four main variables, the scores of the CES-D, the MHC-SF and the use of first person singular and plural pronouns, from t_1 to t_7 , split by the groups *strong* and *small improvement* was conducted, in order to assess whether both groups display similar results and the population is therefore equally distributed. Furthermore, an independent t-test for the measurements of t_1 and t_7 showed the differences between the groups, to make sure that the groups are significantly diverse at the time points of pre- and post-measurement. After identifying if the grouping-variable ‘improvement in depression’ as sufficiently distinctive for participants with *strong* and *small improvement*, the predictive value of the use of the syntax with respect to the two groups *strong* or *small improvement* was assessed. By the means of a binary logistic regression it was analysed whether an increase or decrease, respectively, in use of first person pronouns predicts a *strong* or *small improvement* in depression.

(3) Sample Divided by Gender. Lastly, the syntactical outcomes of the first and the last exercise were related to the gender of the participants. A MANOVA assessed the use of

first person singular and plural pronouns at t_1 and t_7 for male and female participants.

Additionally, a point-biserial correlation was used to review the relationship between gender and the use of pronouns in the first and last week of the intervention.

3 Results

3.1 Statistics and Developments for the Overall Study Population

Developments. Firstly, results concerning the mean values, standard deviations, and the developments of the main constructs depression, well-being, and the syntax use, from t_1 to t_7 will be reported. Table 4.1 reveals that the mental health of the participants ($N = 67$) improved over the course of the intervention significantly with strong effects, which is in line with the hypothesis (1a) based on the assumptions made by Lamers, et al. (2015). Depression is significantly reduced ($F(1, 67) = 72.89, p < .001, \eta_p^2 = .525$) (Figure 4.1) and well-being ($F(1, 67) = 27.33, p < .001, \eta_p^2 = .293$) significantly increased (Figure 4.2) over the course of the intervention (see Table 4.1). Also, the use of syntactical constructs changed from week one of the intervention to week seven significantly. First person singular pronouns (Figure 4.3) are used significantly more often towards the end of the intervention with strong effects ($F(1, 67) = 26.15, p < .001, \eta_p^2 = .284$). While these findings are in line with the hypothesis (1b) with respect to an altered usage of the first person singular pronouns, the use of first person plural pronouns (Figure 4.4) is, however, significantly less frequent in week seven than in week one, even if only with a medium effect size ($F(1, 67) = 6.41, p = .014, \eta_p^2 = .089$) (see Table 4.1). These developments are interpreted as an increase in agency, in accordance to the increase in the use of first person singular pronouns, and a decrease in communion expressed by the diminished use of first person plural pronouns over the course of the intervention.

These changes in the use of the syntax can be identified in qualitative fragments of the analysed life-stories.

For example, a female participant wrote in week one (t_1):

Hoe moet dit verder? Komt het wel goed? Mijn broer en schoonzus verloren, bijna dertig jaar geleden, een dochtertje van 10 jaar aan een virusinfectie en een kind verliezen is wel zo'n beetje het ergste wat je kan overkomen.

In week seven she wrote (t_7):

De tranen biggelen me over de wangen nu ik weer even intensief aan je denk. De bedoeling van de cursus ervaarde ik als een les in evenwicht zoeken tussen positieve en negatieve emoties d.m.v. communicatie of schrijven. Dit is me wel gelukt, want je weet dat ik positief in het leven sta en hierin hebben jij en pap een aandeel gehad. Nooit veroordelend, maar wel stimulerend bij de dingen die ik deed.

Not only does every sentence in the text fragment of week seven (t_7) contain a first person singular pronoun ('ik'), but is also more positively connoted and evolves more around herself as the topic. Whereas the text fragment of week one (t_1) does not contain any first person singular pronouns and is more concerned with the people in her direct environment than herself. These differences in the use of first person singular pronouns is also evident in the weekly acquired statistics. On average, she used 'ik' .02 times per word in the first week (t_1), whereas in week seven (t_7), she used the first person singular .047 times per word.

Relationships. Furthermore, significant relationships between some constructs over the course of the intervention were found (see Table 4.2). The participants' depression and well-being are substantially negatively correlated at the beginning ($r = -.394^{**}$) and at the end ($r = -.473^{**}$) of the intervention (see Table 4.2), which is in accordance to the hypothesis (1c)

and indicates that at both time points of measurement, participants with high levels of depression display a lower level of well-being, whereas low scores on the depression scale are associated with high levels of well-being. Contrary to the hypothesis (1c), at week one ($r = -.296^*$) and week seven ($r = -.30^*$) the use of first person singular pronouns and plural pronouns are moderately negatively correlated (see Table 4.2). This demonstrates that a greater use of first person singular pronouns is, at both measurements, associated with a less frequent use of first person plural pronouns, and vice versa. Against the background of the prevailing theory, these findings on the syntax use can be transferred to the constructs of agency and communion. Furthermore, no significant findings regarding the relationship between mental health (depression and well-being) and the use of first person singular and plural pronouns, respectively, were found, which is contrary to hypothesis 1c.

Interactions. With respect to the interaction between the changes in syntax and the changes in depression, respectively well-being, are as well no effects found (Table 4.3), contrariwise to the hypothesis (1d).

3.2 Sample Divided by Strong / Small Improvement in Depression

Discriminatory Value of the Grouping Variable Improvement in Depression. For both groups, *strong improvement* ($n = 36$) ($F(1, 36) = 152.734, p < .001, \eta_p^2 = .814$) and *small improvement* ($n = 31$) ($F(1, 31) = 9.777, p = .004, \eta_p^2 = .246$) in depression, the scores on the CES-D significantly decreased between t_1 and t_7 (Table 5.1). For well-being, only the *strong improvement* group did significantly improve ($F(1, 36) = 47.918, p < .001, \eta_p^2 = .578$), whereas the *small improvement* group did not ($F(1, 36) = 1.936, p = .174, \eta_p^2 = .061$). Also, the use of first person singular pronouns increased significantly for both groups, displaying *strong* ($F(1, 36) = 13.386, p = .001, \eta_p^2 = .277$) and *small* ($F(1, 31) = 12.825, p = .001, \eta_p^2 = .299$) improvement (see Table 5.1). However, in contrast to the overall statistics (Table 4.1),

there is no significant change in the use of first person plural pronouns found, when the study population is divided by the grouping variable (*strong improvement*: $F(1, 36) = 2.844, p = .101, \eta_p^2 = .075$, *small improvement*: $F(1, 31) = 3.731, p = .63, \eta_p^2 = .111$; see Table 5.1). A difference in the two groups however is remarkable by the smaller effect sizes for the group with smaller improvement and greater effect sizes for the *strong improvement* group, with regard to the improvement in depression and well-being.

Furthermore, according to the independent samples t-test (Table 5.2), a division by the median allows a sufficient differentiation between the two groups. There seems to be a significant difference between the groups *strong* and *small improvement* concerning the levels of depression (CES-D) at t_1 ($t(65) = 2.629; p = .011$) and t_7 ($t(65) = -3.724; p < .001$). Also, there is a significant difference between the groups in well-being (MHC-SF) in week seven (t_7) ($t(65) = 3.003; p = .004$), but not in week one (t_1) ($t(65) = .486; p = .628$). Despite the fact that the grouping-variable *strong / small improvement* in depression does not discriminate for the use of first person singular and plural pronouns at both time points of measurement (see Table 5.2), it is discriminant for the levels of depression in the sample and therefore conforming to the hypothesis (2a).

Predictive Value of the Syntax. Binary logistic regressions were conducted in order to test whether a change in the syntax could predict membership to the groups *strong* and *small improvement* in depression. According to Cox & Snell's R^2 and Nagelkerke's R^2 only 0.2 respectively 0.3% of the variance of the dependent variable depression can be explained by the covariates first person singular and plural pronouns used (see Table 6.1). In accordance to these findings, the covariates (change in first person singular / plural pronouns usage) have no significant predictive value with respect to the improvement in depression and the hypothesis (2b) could therefore not be confirmed (see Table 6.1). Furthermore, predictions regarding the membership to the *strong improvement* or *small improvement* group in

depression, were conducted using the proposed model and were correct in 50.7% of the cases (Table 6.2.1). However, predictions done without the model were correct in 53.7% of the time (Table 6.2.2).

3.3 Sample Divided by Male and Female Participants

With respect to gender and the syntax used, there seem to be no significant differences in the use of first person singular and plural pronouns in the first and last week of the intervention between male and female participants (Table 7.1). An exception is the use of first person plural pronouns at the beginning of the intervention ($F(1, 67) = 4.132, p = .046$). There, men ($n = 14$) made significantly more use of ‘we/wij’ in comparison to the female ($n = 53$) participants ($r_{pb} = -.244^*$) (Table 7.2).

As an example, this is what a male participant wrote in week 1:

Niet dat het erg was want we gingen toch vroeg naar bed, maar thuis was er geen gezelligheid, want om 7 uur moesten we naar bed. Als kind, zijn wij niet opgevoed wij werden al direct als grote mensen beschouwd, en daar handelde hij ook naar.

This is what a female participant wrote:

Ik herinner me het moment nog dat m'n vader ons verliet, ik zal zo'n jaar of 4 geweest zijn, hij spuugde m'n moeder in het gezicht, wij stonden met z'n 3en naast elkaar in de gang, m'n moeder in het midden. M'n kleine broertje nam het voor haar op, m'n vader schopte hem toen tegen z'n benen. Ikzelf stond helemaal stijf van schrik en kon niet reageren.

The male participant had an average use of .013 times ‘we/wij’ per word. The female participant used the first person plural pronouns less than .001 times per word.

A close relationship between male and female attributes and agency, respectively communion was found in former studies (Helgeson, 1994; Saragovi, et al., 1997). Therefore, female participants are expected to make greater use of first person plural pronouns and males are associated with using first person singular pronouns more frequently. These expectations (hypothesis 3a) could not be confirmed in this study.

Overall, hypotheses regarding the developments in depression, well-being, and the syntax use over the course of the intervention from t_1 to t_7 could be confirmed and significant changes are found. However, an explanatory relationship between the syntax use and the changes in depression could not be found and the hypotheses could not be confirmed.

4 Discussion

The aim of this study was to examine the relationship between depression, well-being and the common factors agency and communion, and their linguistic representations in the context of a psychotherapeutic intervention. In general, significant improvements with respect to mental health, as well as significant increases in agency and communion, represented by first person pronouns, could be found in this study. However, neither relationships between these constructs, nor their developments and their linguistic representations could be detected.

The effectiveness of the intervention ‘Op Verhaal Komen’ (OVK) could be confirmed for the selected sample of the current study and the participants’ mental health, measured by the CES-D and the MHC-SF, improved significantly (cf. Lamers, et al., 2015). As a central finding of the present study, the syntax used by the participants, in this case the first person singular and plural pronouns, changed significantly. Also, conforming to the stated hypotheses about the developments in syntax use, first person singular pronouns increased over the course of the intervention and therefore agency increased as well. The hypothesis

that an increase in communion is expected, measured by an increase in the use of first person plural pronouns, could not be confirmed, as per contra the use of first person plural pronouns decreased over the course of the intervention.

These changes in depression, well-being and the linguistic markers of agency and communion give reason to argue that these developments in mental health and syntax usage appear simultaneously and might therefore be inter-dependent. Nevertheless, neither a relationship between these simultaneous changes, nor a predictive value of the change in the syntax used for the change in depression is found. Therefore, the inconsistencies concerning the relationship between depression and agency and their linguistic representations could not be disclosed. As earlier research suggested, agency as well as depression are linguistically represented by one's use of first person pronouns. However, both constructs are negatively correlated and therefore appear to be incompatible with respect to their linguistic operationalization. The results indicate a significant change in syntax use and a simultaneous increase in mental health of the participants. Albeit, the results could not yet give enough insight into the relationship between the concepts of agency and communion, mental health measurements and their syntactical representations.

Furthermore, there are two questionable outcomes regarding the operationalization of agency and communion via first person pronouns. First of all, the two constructs agency and communion are perceived as two distinct entities within an individual, with no underlying factor or correlation (Helgeson, 1994; Saragovi, et al., 1997). Contrary to this theory, there was a correlation between the first person singular and plural pronouns in the first and seventh week of the intervention observed. If the syntax use reflected one's level of agency respectively communion, the use of first person singular and plural pronouns should be as well independent. As in this study the use of first person singular and plural pronouns is correlated, while agency and communion are generally not, it could be argued that in this

case the first-person pronouns can possibly not be perceived as an operationalization of the levels of agency and communion in this study design.

Secondly, the same is applicable to the relation between gender, agency and communion. Research suggests that male, respectively female behaviour and attributes are related to agency and communion (Helgeson, 1994; Saragovi, et al., 1997). Therefore, if the pronouns used reflected an agentic or communal way of speaking / writing, the use of pronouns would be expected to correlate with gender. However, this could not be confirmed in this study. There are no significant gender-dependent differences found in the levels of agency / communion indicated by the use of first person pronouns. Here as well, it appears that the pronouns used are not a sufficient representation of the levels of agency and communion within the sample of this study.

Overall, these unexpected findings are more likely to be due to some limitations (see paragraph 4.1) of the study, and not because the operationalization of agency and communion via first person pronouns is inapplicable. A central argument for this is, that in prevailing theory the relationship between pronouns and depression is broadly empirically confirmed. Therefore, at least a negative relationship between first person singular pronouns and the improvement in depression should have been found. Consequently, it could be the case that the present study set-up is not sufficient to reveal any relationships between mental health, common factors, and the use of first person pronouns. Therefore, the operationalization of agency and communion using first person pronouns might still be applicable, as there is an increase in first person singular pronouns found parallel to an improvement in depressive symptoms, but the design of the presented study might have limitations to expose a relationship.

4.1 Limitations and Strengths

Because of these difficulties in operationalizing the common factors agency and communion by the means of first person pronouns, conclusions must be drawn carefully from the results of this study.

Data assessment in the context of an intervention holds several disadvantages with respect to research purposes: First of all, the study population is relatively small, which gives reason to be cautious when deducing any conclusions from the data, especially with respect to the imbalanced groups of male and female participants. A second possible reason why these findings come about might be unintentional manipulations of language use, created by the exercises within the intervention, which may bias the content of the participants' narratives. On one hand, different exercises over the course of the whole intervention period might have influenced the language used by the participants differently at week one, compared to week seven. Therefore, the assessments at the beginning and the end of the intervention possibly do not target the same constructs. A comparable measurement of the natural language at the first and last week of the intervention may therefore be distorted and confounded, which might be a threat to the construct validity of the study.

On the other hand, the implementation of exercises generally may have a manipulating effect on the natural language of the participants, which is not desirable with respect to this study. Under this assumption, the assessment of language would reflect the syntax with respect to the exercises. It is possible that the exercises have an overpowering influence on the language use and thus might distort the effect that depression, agency or communion have on language. The measurement of the language might therefore not assess the syntax affected by the state of depression, gender, or well-being, but the syntax use in the context of the exercises. Additionally, Chung and Pennebaker (2007) have suggested that the use of function words within the context of naturally spoken language is less thought-tough

than written language and is consequently a more direct representation of the mental state. An assessment of spoken language could have had as well different outcomes than the narrative exercises used in the context of this study. Taking these points into consideration, it could be possible that the syntax assessed in this study might not directly represent the participants states or changes in depression, agency, and communion.

Finally, there are no direct measurements of agency and communion collected, therefore a validation of these constructs and their operationalization via pronoun use is missing. Consequently, the constructs of agency and communion could not be directly related to the syntax, depression, well-being, or gender. The first-person pronouns only had a vicarious role for agency and communion, therefore the association between syntax and agency / communion is only based on theory, and not empirically proven as applicable for the present data. The relationship between the use of first person pronouns, agency and communion is in this case presumed. This might be methodological problematic, because this relation is not examined in detail yet. For this reason, this assumed operationalization should not be taken as definitive and pertinent to any population and any population size. Future research and confirmation of the inter-relation is therefore needed, in order to validate the usage of first person pronouns as markers of agency and communion.

With respect to the current study, especially regarding the use of the parsing program GrE TEL, some aspects are uncertain about the program's performance, which could restrain the validity of the measurements. Little is known on how the program deals with syntactical ambiguities, for example if there are grammatical mistakes, unfinished sentences, or enumerations. The parser could possibly have difficulties in recognizing some grammatical constructions and could therefore exclude some sentences from analysis. In order to avoid possible inconsistencies in the data, a preparation of the documents is necessary. As declared in the methods section (see paragraph 2.4.1), the text processing program Word 2016 was

used to maintain objectivity when alternating the original texts by correcting spelling errors. However, this method still left the texts with several grammatical and spelling mistakes, which reduced the amount of data recognizable for the parsing program. These aspects would be needed to be addressed with respect to future projects.

The same applies to the content of the textual data. Several parts of the e-mail conversations did not evolve around the psychotherapeutic context, but were related to the organization of the intervention, excuses for delays, or acquaintances between counsellor and participant. Although these parts were excluded from data analysis and only content related to the exercises of OVK were included, this unavoidable way of modifying the original data holds risks of human error. The use of a parsing program does therefore not completely avoid human error, as originally intended. Additionally, the parser is used in order to be able to handle greater amounts of data. However, when having a within-subjects design, the data still needs to be analysed per participant, which also results in a vast number of files, uploads and parsing of small amounts of data.

Overall, the reliability and validity of the study might be restricted by the way of assessing the syntax and language used by the participants. On one hand, because the participants' use of language is not completely natural and presumably influenced to a greater extent by the exercises of the course than by the levels of depression, well-being, or agency / communion. On the other hand, the parsing program used, GrETEL, is a very new program and experience on how the program deals with ambiguities in the texts, possibly leading to an incomplete assessment of the participants' syntax use, is lacking. The most impairing limitation of this study is however, that the constructs agency and communion were not directly assessed during the data collection. Because of that, only presumptions about the presence of agency and communion could be made, based on the gathered linguistic data.

Nevertheless, with respect to first person singular pronouns, there are some promising developments found in this study, which indicate that the use of pronouns does evolve in the context of a psychotherapeutic intervention and needs further investigation. This study discusses the themes of agency, communion and mental health in the context of language in a way it has not been done before. Especially, the inconsistencies and contradictions concerning the interaction of these concepts and their linguistic representations have not yet been discussed before. In the context of this problem, particularly the review of syntax as a representation of agency and communion has several advantages. When analysing function words (e.g. pronouns) there is less ambiguity than when looking at the semantic representations of a construct. Content words can be used in an ironic way or can have several meanings. Function words on the other hand, in this case first person pronouns, are used more unconsciously and are therefore rarely used ambiguously or in a different context than when talking about oneself or oneself in relation to other people as a group, respectively (Chung & Pennebaker, 2007). Also, this research is conducted over two different therapeutic conditions, expressive writing and life-review. This contributes to the external validity of the findings and integrates the idea behind common factors, namely that agency and communion should be detectable across different therapy approaches.

4.2 Recommendations

Although there are no definite relationships found, the assessment of the presented contradictions concerning the linguistic representations of agency and depression are worth further investigation, because several findings could indicate the importance of language use in the context of psychotherapy. Furthermore, a possible operationalization of mental health, agency and communion via pronouns may have positive implications for the evaluation of psychotherapeutic treatments.

With respect to further research, this study could inquire some criteria which should be taken into account: Firstly, the linguistic representations of mental health or common factors, like agency, are not yet well enough assessed in order to handle them as an operationalization of the constructs. Therefore, the measures of all constructs of interest, in this case agency, communion, depression and well-being, need to be collected. Secondly, for a more precise assessment of the linguistic representations, natural spoken language, rather than written language, should be analysed (Chung & Pennebaker, 2007). And most importantly, the participants' language use should not be investigated directly within an intervention or therapeutic context where methods like narrative writing exercises are applied, in order to avoid any steering or external specification of the content spoken / written about by the participants.

4.3 Conclusion

Although the aim of this study, to investigate the contradictions of the relationship between the linguistic representations of mental health factors and common factors, could not be met, other important implications were found and the field of pronouns as a linguistic marker of agency, communion, and depression seems promising. A change is detected in the use of first person pronouns, which gives reason to further investigate the use of pronouns in the context of mental health improvement and common factors. It appears that relationships between these syntactical and psychological measurements could not be indicated, probably due to limitations in the study design. Therefore, with respect to future research, this study could also identify important criteria, that could contribute to a more sophisticated assessment of language use in the context of mental health, common factors, and their relationship.

References

- Ahn, H. N., & Wampold, B. E. (2001). Where oh where are the specific ingredients? A meta-analysis of component studies in counselling and psychotherapy. *Journal of Counselling Psychology*, 48(3), 251-257.
- Adler, J. M. (2012). Living into the story: Agency and coherence in a longitudinal study of narrative identity development and mental health over the course of psychotherapy. *Journal of Personality and Social Psychology*, 102(2), 367-389.
- Ahearn, L. M. (2001). Language and agency. *Annual Review of Anthropology*, 30(1), 109-137.
- Arntz, A., Hawke, L. D., Bamelis, L., Spinhoven, P., & Molendijk, M. L. (2012). Changes in natural language use as an indicator of psychotherapeutic change in personality disorders. *Behaviour research and therapy*, 50(3), 191-202.
- Augustinus, L., Schuurman, I., Vandeghinste, V., & Van Eynde, F. (2014). *GrETEL: Searching for breadcrumbs in texts*. Centre for Computational Linguistics KU Leuven. Retrieved 17 July 2017 from <http://nederbooms.ccl.kuleuven.be/documentation/EducationalModule-v4b.pdf>
- Augustinus, L., Vandeghinste, V., & Van Eynde, F. (2012). "Example-Based Treebank Querying" In: Proceedings of the 8th International Conference on Language Resources and Evaluation (LREC-2012). Istanbul, Turkey. pp. 3161-3167.
- Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist*, 44(9), 1175-1184.
- Bloom, K., & Tam, J. (2015). Promoting the use of science in psychology: A knowledge mobilization model for increasing evidence-based practice. *Canadian Psychology / Psychologie Canadienne*, 56(1), 147-150.
- Bohlmeijer, E. (2007). Reminiscence and depression in later life (Dissertation). Amsterdam: Faculty of Psychology and education, Vrije Universiteit.
- Bouma, J., Ranchor, A.V., Sanderma, R., & van Sonderen, E. (1995). Het meten van symptomen van depressie met de CES-D: een handleiding. Groningen: Noordelijk centrum voor gezondheidsvraagstukken, Rijksuniversiteit Groningen.
- Bouma, G., Van Noord, G., & Malouf, R. (2001). Alpino: Wide-coverage computational analysis of Dutch. *Language and Computers*, 37(1), 45-59.
- Braakmann, D. (2015). Historical Paths in Psychotherapy Research. In *Psychotherapy Research* (pp. 39-65). Springer Vienna.
- Bruch, M. A. (2002). The relevance of mitigated and unmitigated agency and communion for depression vulnerabilities and dysphoria. *Journal of Counseling Psychology*, 49(4), 449-459.

- Buss, D. M. (1990). Unmitigated agency and unmitigated communion: An analysis of the negative components of masculinity and femininity. *Sex Roles*, 22(9), 555-568.
- Chung, C., & Pennebaker, J. W. (2007). The psychological functions of function words. In K. Fiedler (Ed.), *Social communication* (pp. 343-359). New York: Psychology Press.
- De Choudhury, M., Gamon, M., Counts, S., & Horvitz, E. (2013). Predicting Depression via Social Media. *ICWSM*, 2, 128-137.
- Dempster, A. P., Laird, N. M., & Rubin, D. B. (1977). Maximum likelihood from incomplete data via the EM algorithm. *Journal of the royal statistical society*, 39, 1-38.
- DeWall, C. N., Pond Jr, R. S., Campbell, W. K., & Twenge, J. M. (2011). Tuning in to psychological change: Linguistic markers of psychological traits and emotions over time in popular US song lyrics. *Psychology of Aesthetics, Creativity, and the Arts*, 5(3), 200-207.
- Etchison, M., & Kleist, D. M. (2000). Review of narrative therapy: Research and utility. *The Family Journal*, 8(1), 61-66.
- Eid, M., Gollwitzer, M. & Schmitt, M. (2015). *Statistik und Forschungsmethoden* (4. Aufl.). Weinheim: Beltz.
- Garcia, D., Anckarsäter, H., Kjell, O. N., Archer, T., Rosenberg, P., Cloninger, C. R., & Sikström, S. (2015). Agentic, communal, and spiritual traits are related to the semantic representation of written narratives of positive and negative life events. *Psychology of Well-Being*, 5(8), 1-20.
- Gelo, O. C. G., Salcuni, S., & Colli, A. (2012). Text analysis within quantitative and qualitative psychotherapy process research: Introduction to special issue. *Research in Psychotherapy: Psychopathology, Process and Outcome*, 15(2), 45-53.
- Grencavage, L. M., & Norcross, J. C. (1990). Where are the commonalities among the therapeutic common factors?. *Professional Psychology: Research and Practice*, 21(5), 372-378.
- Helgeson, V. S. (1994). Relation of agency and communion to well-being: Evidence and potential explanations. *Psychological Bulletin*, 116(3), 412-428.
- Hill, C. E., & Corbett, M. M. (1993). A perspective on the history of process and outcome research in counselling psychology. *Journal of Counselling Psychology*, 40(1), 3-24.
- Hobbs, M., & McLaren, S. (2009). The interrelations of agency, depression, and suicidal ideation among older adults. *Suicide and Life-threatening Behavior*, 39(2), 161-171.
- Howes, C., Purver, M., & McCabe, R. (2014). Linguistic indicators of severity and progress in online text-based therapy for depression. *ACL 2014*, 7-16.

- Imel, Z. E., Steyvers, M., & Atkins, D. C. (2015). Computational psychotherapy research: Scaling up the evaluation of patient-provider interactions. *Psychotherapy, 52*(1), 19-30.
- Kazdin, A. E. (2009). Understanding how and why psychotherapy leads to change. *Psychotherapy research, 19*(4-5), 418-428.
- Keyes, C. L., Wissing, M., Potgieter, J. P., Temane, M., Kruger, A., & van Rooy, S. (2008). Evaluation of the mental health continuum-short form (MHC-SF) in Setswana-speaking South Africans. *Clinical Psychology and Psychotherapy, 15*(3), 181-192.
- Klis, van der, M. & Odijk, J. (2017). "Corpus Upload and Metadata Analysis Extensions for GrETEL". (accepted) Demonstration at Digital Humanities Benelux 2017. Utrecht, The Netherlands.
- Knobloch-Fedders, L. M., Elkin, I., & Kiesler, D. J. (2015). Looking back, looking forward: A historical reflection on psychotherapy process research. *Psychotherapy Research, 25*(4), 383-395.
- Lamers, S. M., Bohlmeijer, E. T., Korte, J., & Westerhof, G. J. (2015). The efficacy of life-review as online-guided self-help for adults: A randomized trial. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 70*(1), 24-34.
- Lamers, S., Westerhof, G. J., Bohlmeijer, E. T., ten Klooster, P. M., & Keyes, C. L. (2011). Evaluating the psychometric properties of the mental health continuum-short form (MHC-SF). *Journal of Clinical Psychology, 67*(1), 99-110.
- McAdams, D. P. (1993). *The stories we live by: Personal myths and the making of the self*. New York: William Morrow.
- McAdams, D. P., Bauer, J. J., Sakaeda, A. R., Anyidoho, N. A., Machado, M. A., Magrino-Failla, K., ... & Pals, J. L. (2006). Continuity and change in the life story: A longitudinal study of autobiographical memories in emerging adulthood. *Journal of Personality, 74*(5), 1371-1400.
- Messer, S. B., & Wampold, B. E. (2002). Let's face facts: Common factors are more potent than specific therapy ingredients. *Clinical Psychology: Science and Practice, 9*(1), 21-25.
- Meyers, A. (2014). *Grammars and Parsing*. Cornell University Department of Computer Science. Retrieved 15 May 2017 from <http://www.cs.cornell.edu/courses/cs2112/2014fa/lectures/lecture.html?id=parsing>
- Nederlands Jeugdinstituut (n.d.). Retrieved 11 April 2017 from: [http://www.nji.nl/nl/Databank/Databank-Instrumenten/Center-for-Epidemiological-Studies-Depression-Scale-\(CES-D\)](http://www.nji.nl/nl/Databank/Databank-Instrumenten/Center-for-Epidemiological-Studies-Depression-Scale-(CES-D))
- Postel, M. G., Lammers, S., Westerhof, G. J., & Bohlmeijer, E. T. (2012). *Research Protocol Op Verhaal Komen*. Psychologie, Gezondheid en Technologie, Universiteit Twente, Enschede.

- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*(3), 385-401.
- Rosenzweig, S. (1936). Some implicit common factors in diverse methods of psychotherapy. *American Journal of Orthopsychiatry, 6*(3), 412-415.
- Rude, S., Gortner, E. M., & Pennebaker, J. (2004). Language use of depressed and depression-vulnerable college students. *Cognition & Emotion, 18*(8), 1121-1133.
- Saragovi, C., Koestner, R., Di Dio, L., & Aubé, J. (1997). Agency, communion, and well-being: Extending Helgeson's (1994) model. *Journal of Personality and Social Psychology, 73*(3), 593-609.
- Sedlmeier, P., & Renkewitz, F. (2013). *Forschungsmethoden und Statistik: Ein Lehrbuch für Psychologen und Sozialwissenschaftler* (2. überarb. und erw. Auflage). München: Pearson.
- Slaby, J., Paskaleva, A., & Stephan, A. (2013). Enactive emotion and impaired agency in depression. *Journal of Consciousness Studies, 20*(7-8), 33-55.
- Stiles, W. B., & Shapiro, D. A. (1989). Abuse of the drug metaphor in psychotherapy process-outcome research. *Clinical Psychology Review, 9*(4), 521-543.
- Street, R. L., Makoul, G., Arora, N. K., & Epstein, R. M. (2009). How does communication heal? Pathways linking clinician–patient communication to health outcomes. *Patient Education and Counselling, 74*(3), 295-301.
- Tan, A. H. (1999). Text mining: The state of the art and the challenges. *Proceedings of the PAKDD 1999 Workshop on Knowledge Discovery from Advanced Databases, 8*, 65-70.
- Tausczik, Y. R., & Pennebaker, J. W. (2010). The psychological meaning of words: LIWC and computerized text analysis methods. *Journal of Language and Social Psychology, 29*(1), 24-54.
- Tromp, T. (2011). Het analyse-instrument. In *Het verleden als uitdaging* (p. 90-131). Amsterdam, the Netherlands: Boekencentrum Academia.
- Wallerstein, R. S. (2001). The generations of psychotherapy research: An overview. *Psychoanalytic Psychology, 18*(2), 243-267.

Tables, Plots and Figures

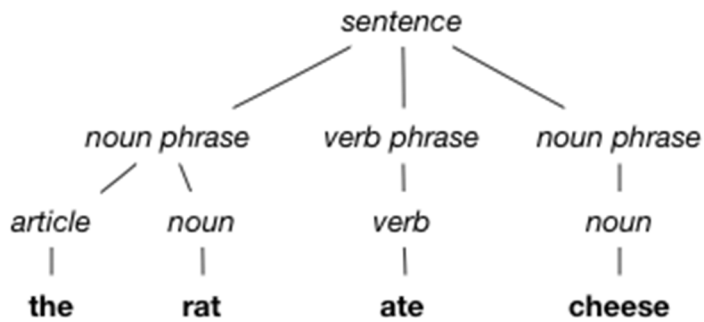


Figure 1. Parse tree (Meyers, 2014).

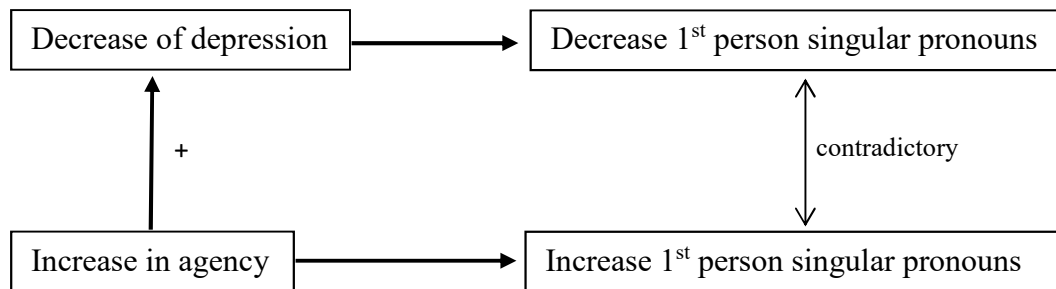


Figure 2. The contradiction of the relation between agency and depression and their linguistic representations.

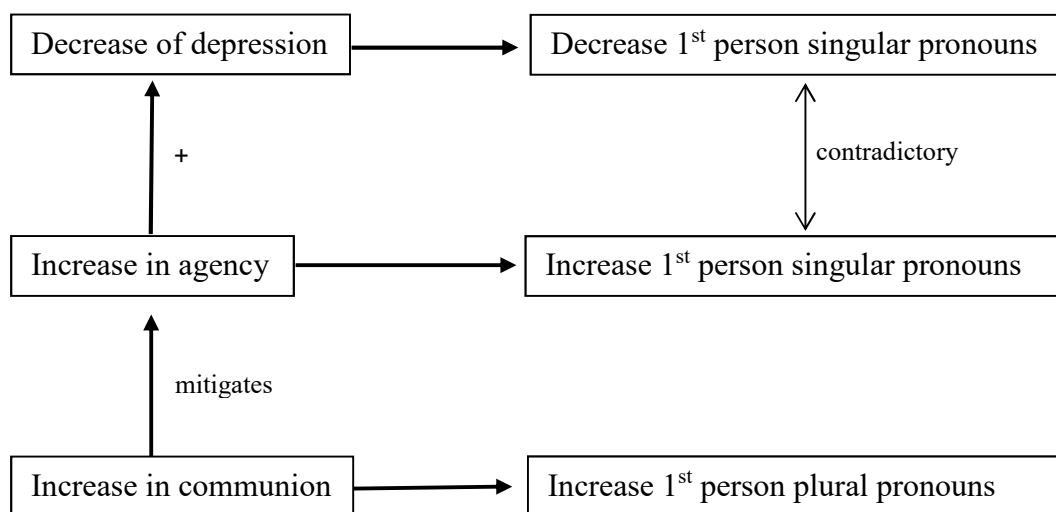


Figure 3. The contradiction of the relation between agency, communion, depression, and their linguistic representations.

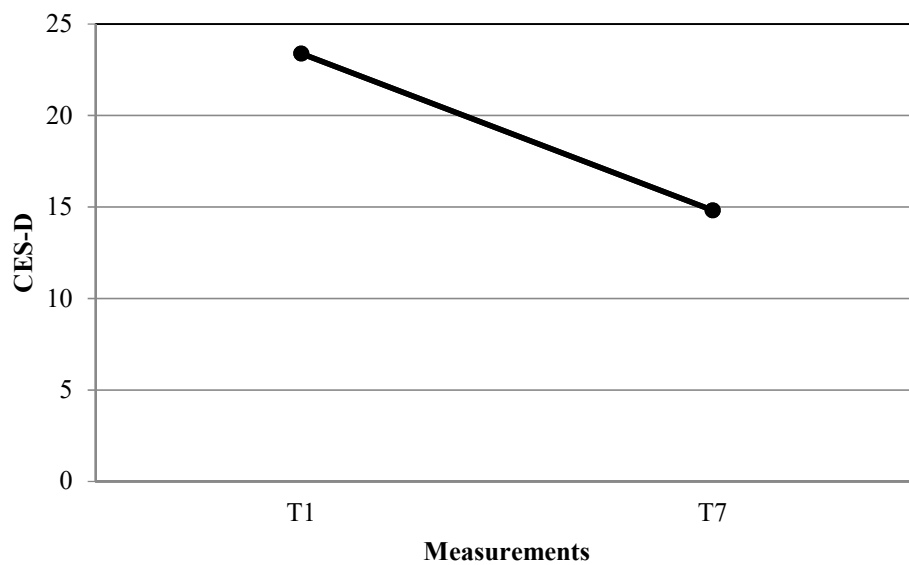


Figure 4.1. Change in depression (CES-D) over the course of the intervention from t_1 to t_7 .

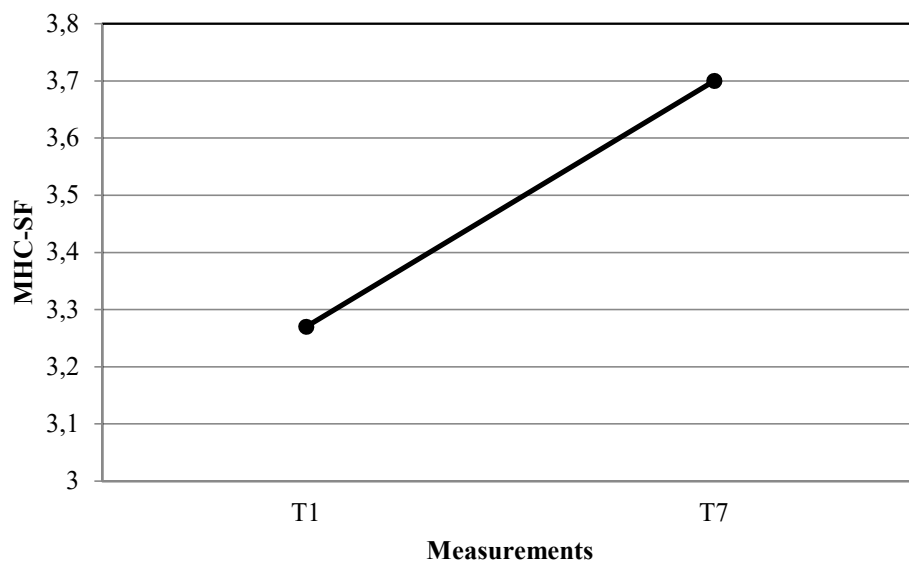


Figure 4.2. Change in well-being (MHC-SF) over the course of the intervention from t_1 to t_7 .

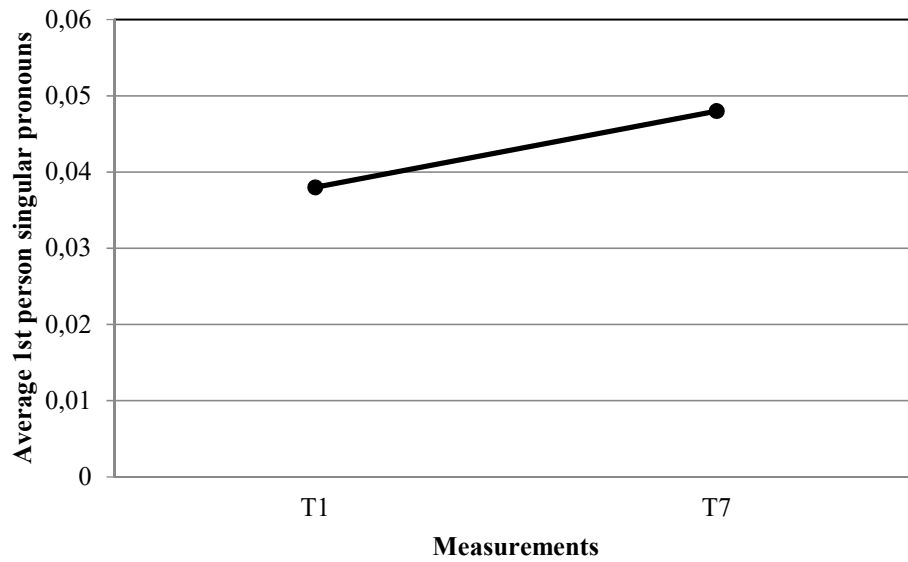


Figure 4.3. Change in the use of first person singular pronouns over the course of the intervention from t_1 to t_7 .

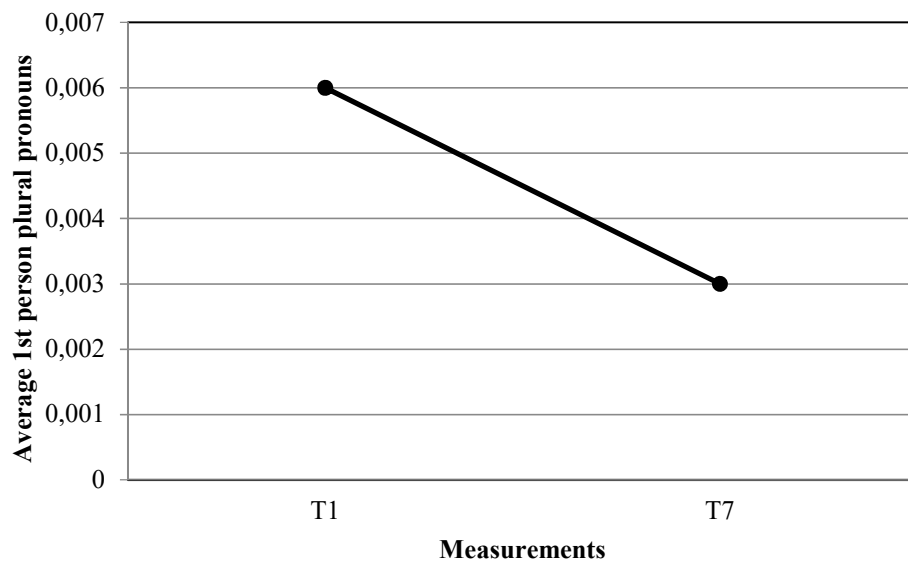


Figure 4.4. Change in the use of first person plural pronouns over the course of the intervention from t_1 to t_7 .

Table 1
Timeline of data collection

	0 A	0 B	Intervention	1	2	3
MINI	X					
CES-D	X			X	X	X
MHC-SF		X		X	X	X
Op Verhaal Komen						
<i>Exercise 1</i>			X			
<i>Exercise 2</i>			X			
<i>Exercise 3</i>			X			
<i>Exercise 4</i>			X			
<i>Exercise 5^a</i>			X			
<i>Exercise 6</i>			X			
<i>Exercise 7</i>			X			
<i>Exercise 8</i>			X			

Note. X – Marks the measurement moment

CES-D is the instrument used to assess depression; MHC-SF is the instrument used to assess well-being.

^a Exercises 5 was facultative

0 – Baseline

 A: Screening

 B: Baseline after inclusion

Intervention – 8 weeks with a 3-week phase-out period

1 – after completion of the intervention (3 months after baseline)

2 – 3 months after completion of the intervention (6 months after the baseline)

3 – 9 months after completion of the intervention (12 months after the baseline)

Table 2
Age of the overall sample, and male and female participants

	Male	Female	Total
N	14	53	67
M (SD)	59.43 (11.257)	58.21 (8.273)	58.46 (8.896)
Min	44	42	42
Max	79	80	80

Table 3
Data distribution and missing data over the whole intervention period

Exercise	1	2	3	4	5	6	7	8	CES-D t ₁	CES-D t ₇	MHC-SF t ₁	MHC-SF t ₇
Completed	67	67	67	65	29	64	59	25	67	65	67	65
Not Completed	0	0	0	2	38	3	8	42	0	2	0	2
Total completed %	100	100	100	97	43,3	95,5	88,1	37,3	100	97	100	97

Note. CES-D is the instrument used to assess depression; MHC-SF is the instrument used to assess well-being.

Table 4.1

Differences from t_1 to t_7 in depression, well-being and syntax used (1st person singular / plural pronouns) ($N = 67$)

	<i>M (SD)</i>		<i>F (df)</i>	<i>p</i>	η_p^2	<i>CI (95%)</i>			
	t_1	t_7				t_1		t_7	
						Lower	Upper	Lower	Upper
CES-D	23.39 (8.47)	14.82 (8.04)	72.89 (1)	<.001	.525	21.32	25.45	12.86	16.78
MHC-SF	3.27 (.81)	3.7 (.82)	27.33 (1)	<.001	.293	3.07	3.5	3.47	3.9
1 st person singular	.038 (.016)	.048 (.016)	26.15 (1)	<.001	.284	.034	.042	.045	.052
1 st person plural	.006 (.006)	.003 (.005)	6.41 (1)	.014	.089	.004	.007	.002	.004

Note. CES-D is the instrument used to assess depression; MHC-SF is the instrument used to assess well-being.

Table 4.2

Correlations of all measurements at t_1 and t_7 ($N = 67$)

	t_1			t_7		
	1	2	3	1	2	3
1. CES-D	-	-	-	-	-	-
2. MHC-SF	-.394**	-	-	-.473**	-	-
3. 1 st person singular	-.024	-.155	-	-.023	.02	-
4. 1 st person plural	-.045	-.072	-.296*	.021	.182	-.3*

* $p < .05$

** $p < .001$

Table 4.3

Multiple regressions of the interaction between the change in depression and well-being, with first person singular / plural pronoun use

	Δ - CES-D		Δ - MHC-SF	
	β	<i>p</i>	β	<i>p</i>
Δ - 1 st person singular	-.119	.365	.169	.20
Δ - 1 st person plural	.026	.846	-.193	.148

Note. CES-D is the instrument used to assess depression; MHC-SF is the instrument used to assess well-being. Δ - describes the change from t_1 to t_7 , by the subtraction of t_1 from t_7

Table 5.1

Development from t₁ to t₇ for depression, well-being, and the syntax used for the strong improvement (n = 36) and small improvement (n = 31) in depression group

	<i>M (SD)</i>		<i>F(df)</i>	<i>p</i>	η_p^2
	<i>t₁</i>	<i>t₇</i>			
Strong Improvement					
CES-D	25.81 (9.208)	11.72 (7.661)	152.734 (1)	<.001	.814
MHC-SF	3.313 (.80)	3.966 (.773)	47.918 (1)	<.001	.578
1 st person singular	.036 (.015)	.048 (.018)	13.386 (1)	.001	.277
1 st person plural	.006 (.006)	.003 (.006)	2.844 (1)	.101	.075
Small improvement					
CES-D	20.58 (6.602)	18.43 (6.975)	9.777 (1)	.004	.246
MHC-SF	3.217 (.828)	3.396 (.775)	1.936 (1)	.174	.061
1 st person singular	.04 (.018)	.050 (.015)	12.825 (1)	.001	.299
1 st person plural	.006 (.006)	.003 (.004)	3.731 (1)	.063	.111

Note. CES-D is the instrument used to assess depression; MHC-SF is the instrument used to assess well-being.

Table 5.2

Between group (strong / small improvement in depression) differences in CES-D, MHC-SF, and syntax at t₁ and t₇

	<i>t₁</i>			<i>t₇</i>		
	Mean difference	<i>t</i>	<i>p</i>	Mean difference	<i>t</i>	<i>p</i>
CES-D	5.225	2.629	.011	-6.708	-3.724	<.001
MHC-SF	.097	.486	.628	.569	3.003	.004
1 st person singular	-.104	-.899	.372	-.002	-.526	.6
1 st person plural	.015	.381	.704	<.001	.522	.603

Note. CES-D is the instrument used to assess depression; MHC-SF is the instrument used to assess well-being.

Table 6.1

Binary logistic regression of the change in first person singular / plural pronoun usage from t₁ to t₇ and the change in depression

Covariates	Cox & Snell <i>R</i> ²	Nagelkerke <i>R</i> ²	B	S.E.	Wald	<i>p</i>
Total	.002	.003	-	-	-	-
Delta Singular		-	-6.166	15.433	.160	.69
Delta Plural		-	-5.373	31.898	.028	.866

Table 6.2.1

Classification table with included covariates of the binary logistic regression of the change in syntax used from t₁ to t₇ and the change in depression

Groups	Predicted		Percentage correct
	Strong improvement	Small improvement	
Strong improvement	33	3	91.7
Small improvement	30	1	3.2
Overall Percentage	-	-	50.7

Table 6.2.2

Classification table with excluded covariates of the binary logistic regression of the change in syntax used from t₁ to t₇ and the change in depression

Groups	Predicted		Percentage correct
	Strong improvement	Small improvement	
Strong improvement	36	0	100.0
Small improvement	31	0	.0
Overall Percentage	-	-	53.7

Table 7.1

Differences in the syntax used by male (n=14) and female (n=53) participants at t₁ and t₇

	M (SD)		F(df)	p
	Male	Female		
1 st person singular week 1	.036 (.011)	.038 (.018)	.302 (1)	.584
1 st person singular week 7	.049 (.02)	.048 (.015)	.003 (1)	.960
1 st person plural week 1	.009 (.006)	.005 (.006)	4.132 (1)	.046
1 st person plural week 7	.004 (.005)	.003 (.005)	.117 (1)	.733

Table 7.2

Relationship between gender and the use of 1st person pronouns at t₁ and t₇

	1 st person singular pronouns		1 st person plural pronouns	
	t ₁	t ₇	t ₁	t ₇
Gender (<i>r_{pb}</i>)	.068	-.006	-.244*	-.042

Note. Male is coded as 1, female is coded as 2.

*p < .05

Appendix**A: XPath queries****Ik**

```
//node[@lemma="ik" and @pt="vnw"]
```

We

```
//node[@lemma="we" and @pt="vnw"]
```

Wij

```
//node[@lemma="wij" and @pt="vnw"]
```