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Cognitive impairments in schizophrenia

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PART IV GENERAL DISCUSSION

CHAPTER 9

Discussion and clinical implications

9.1 INTRODUCTION

The majority of people with schizophrenia suffer from cognitive impairments. This thesis is concerned with the relationship between these cognitive impairment and everyday functioning in schizophrenia. In this thesis (1) the relationship between deficits in social cognition and performance in daily life and (2) the extent to which everyday functioning can be improved by a cognitive prosthesis have been examined. The first part of this thesis provided a general introduction to the topic. Subsequently, the perception of emotional prosody, an aspect of social cognition that had remained understudied previously, was explored. In the second experiment presented, the relationship between emotion perception, Theory of Mind and social functioning in the community was examined. Implications of the findings for clinical practice were discussed.

The aim of this thesis was not only to understand better the relationship between cognitive impairments and daily functioning, but also to find ways to help patients cope with their impairments. Therefore, in the third part of the thesis the efficacy of a cognitive prosthesis used to compensate for the effects of cognitive impairments in daily life was examined. The results and broader implications of these studies are discussed in this final part of the thesis.

9.2 SOCIAL COGNITION

In the past decade emotion and social cognition in schizophrenia have been the subject of many papers. It has been argued (Aleman and Kahn, 2005) that emotional dysfunction is at the core of schizophrenia. In this thesis two aspects of social cognition in schizophrenia were examined in detail: 1) perception of emotional prosody and 2) the relationship between emotion perception, Theory of Mind (ToM)

and community functioning.

A vast majority of studies on the perception of affect focus on facial expressions, while perception of emotional prosody has received much less attention. Whilst it was known previously that impairments in the perception of emotional prosody existed in schizophrenia, the exact nature of these impairments was not clear (Edwards et al., 2002). Therefore, we decided to study the perception of emotional prosody in schizophrenia in greater detail (see Chapter 4). As hypothesised, perception of emotional prosody was impaired in our sample, particularly the perception of negative emotional prosody. This finding is consistent with studies on the perception of negative facial affect in schizophrenia (Edwards et al., 2002). We were also interested in the types of errors in prosody recognition. It has been demonstrated that people with schizophrenia show a bias in the perception of facial affect (Kohler, et al., 2003). That is, patients have a specific response tendency, they perceive more negative affect in neutral or positive faces than controls. This bias has been linked to the aetiology of paranoid delusions, as others may be perceived as more angry or threatening than they really are. With regard to emotional prosody, we found no bias in the responses of people with schizophrenia. In other words, although patients made more errors in the perception of emotional prosody and particularly in the perception of negative emotions, there was no consistent direction in their mistakes. Therefore, a direct link between paranoid delusions and prosody perception is not assumed.

A recent meta-analysis on the perception of emotional prosody (Hoekert et al., 2007) indicated that prosody perception is among the more severe cognitive impairments in schizophrenia, as patients on average perform more than one standard deviation lower than healthy control subjects. Given the nature and severity of social cognitive impairments in schizophrenia it is reasonable to expect that these impairments will affect functioning in daily life.

In Chapter 4 of this thesis, it was argued that impaired perception of prosody would limit the impact of non-verbal feedback by others (and especially non-verbal negative feedback), which may in turn limit learning in social situations. Furthermore, when the emotional prosody in another's voice is not adequately perceived, it will be very hard to react to him or her in an appropriate and empathic way. Somewhat to our surprise, prosody perception in schizophrenia shared quite a lot of variance with general cognitive abilities.

In Chapter 5 we show that measures of social cognition, in spite of their significant correlation with general cognition, are better predictors of community functioning. A composite measure of social cognition including both emotion perception (facial affect and prosody) and Theory of Mind (detection of a faux pas and empathy) was

a better predictor of community functioning than general cognition and negative symptoms together. Thus, to make predictions about daily community functioning in schizophrenia social cognition should always be assessed. ToM and emotion perception are both significantly correlated with community functioning, so for clinical assessment it is advisable to use multiple measures of social cognition.

Patients with poor social cognition demonstrated poorer independent living skills than their less impaired counterparts. With regard to leisure and social and work activities, patients with poor social cognition and less impaired patients were comparable. Whilst result may suggest that social cognition is more relevant to activities of daily living than to leisure and work activities, an alternative seems to be that specific features of our somewhat homogenous sample (i.e. the fact that the majority was participating in a rehabilitation programme) contributed to the result, since many patients participated in a rehabilitation program, which more or less standardized social activities and limited the opportunities for work. Moreover, patients who did work, were often engaged in sheltered jobs, where demands on cognitive functioning may have been few, rendering (social) cognition not predictive of having a job. Also, the Social Functioning Scale is aiming to assess the quantity of social functioning, whereas social cognition be more predictive of the quality of social community functioning (put in other words, not if, but how well someone performs).

Social cognition was not related to community functioning in healthy controls. Apparently, social cognition is not a limiting factor in healthy subjects. We argued that social cognition is probably only associated with community functioning when abilities are below a certain critical limit. If social cognition is above this level, an individual has the necessary cognitive prerequisites for adaptive community functioning and performance will depend upon other factors. Alternatively, healthy controls may compensate for poorer social cognition by general cognitive abilities, while this compensation potential is lacking in schizophrenia (as poor social cognition is strongly associated with general cognition in schizophrenia). Finally, the relationship between social cognition and social functioning in schizophrenia may depend on specific disease related biases, such as the tendency to perceive more negative affect in facial stimuli. Such perceptual biases will obviously hamper social functioning and are not present in controls.

9.2.1 *Social cognition from an information processing perspective*

In Chapter 2 a number of cognitive models of schizophrenia was discussed. As none of these models explicitly addressed the relationship between cognitive impairments and everyday functioning, Brouwer's elaboration of Norman & Shallice's (1986)

model of information processing as a theoretical framework was used. In Brouwer's model social cognition is viewed as a function that concerns both schema selection (by sensing context information) and monitoring (by sensing when important goals are at stake). As a result, community functioning will be deficient. Social cognitive functions serve to use social cues in schema selection. Properly sensing a threat related stimulus (e.g. an angry face) will prepare for a possible withdrawal, while positive social stimuli may prepare for approach. For example, the sentence "this place looks nice!" pronounced by a roommate in an angry way, means the opposite of what is literally stated. When this sentence is said when facing a very messy room, this may lead to the attribution that the mess annoys the roommate. Therefore, the prosody is a salient cue and may initiate cleaning. Whether the stimulus is translated into a goal-directed response is subsequently dependent on other parts of the model, such as the motivational value of a good relationship with the roommate and the presence of adequate schemata and declarative knowledge for cleaning the room.

Patients in our study showed impaired emotion perception and Theory of Mind. This means that they have difficulties understanding the emotional context of many situations. It is to be expected that these impairments will be even more pronounced in daily life, where healthy people benefit from previously stored knowledge to master complex situations. People with schizophrenia do not have this advantage, as they benefit less from contextual information, such as previous experience with the stimulus or the current context (Hemsley, 2005). Integrating contextual and historical information about an individual (e.g. attitudes, previous experiences) has been identified as an aspect of Theory of Mind (Sabbagh, 2004). It follows that in people with schizophrenia previously stored knowledge about an individual (e.g. about attitudes and preferences) will be used less to infer another's mental state than in healthy persons.

The previous example of the annoyed roommate can be used to illustrate how impaired social cognition can hamper everyday functioning in schizophrenia. In the first place, impaired perception of emotional prosody in schizophrenia may lead to an inaccurate interpretation of what the roommate is saying. Second, previously stored information about the roommate (the messy room and fact that he is known for his conscientious behaviour and keeps his own room very tidy) will make little contribution to understanding the meaning of what the roommate is saying. For these reasons, the statement of the roommate may not be selected as a salient cue for action.

This example illustrates how impairments in social cognition can hamper stimulus selection. When important social cues are missed or interpreted incorrectly, effort and declarative knowledge may not be mobilised at all or will lead to inappropriate

schema selection. This will lead eventually to inadequate social responses. Even in people with schizophrenia without impairments in perceiving emotions in others and attributing mental states to them, the motivational value that is associated with social stimuli may be insufficient, which will also hamper the mobilisation of effort and declarative knowledge. Finally, a schema in itself may not include adequate and social adaptive behavioural information. In this case, the notion of how to behave in a specific social situation may be lacking. General cognitive abilities (attention, memory, and executive functioning) can be used to compensate for the effects of impaired social cognition. As our studies showed that general cognitive abilities are correlated with social cognition, individuals with the poorest social cognitive skills are also expected to have less compensation potential.

9.2.2 *Social cognition: implications for clinical practice*

Our results have several implications for clinical practice. With regard to neuropsychological assessment a number of recommendations were made in Chapter 5.

First, the MATRICS neurocognition committee has proposed a standard test battery to assess cognition in schizophrenia (Nuechterlein et al., 2008). With regard to social cognition, the committee has recommended two tests of the MSCEIT battery (Mayer et al., 2002). As these tests assess only emotion perception and management, they do not cover the entire range of social cognition. Our findings, however, demonstrate that operationally defining social cognition as a multidimensional construct predicts community functioning better than ToM or emotion perception separately. Thus, when clinicians aim to predict outcome in daily life in schizophrenia, we advise them to administer tests that cover multiple domains of social cognition. As ToM was the best predictor of community functioning in our study, a test of ToM abilities should always be included in the test battery. Measures of social cognition should be used in addition to (and not instead of) measures of general cognition and psychiatric symptoms. Only thorough assessment of performance on each of the previously mentioned domains will provide a complete picture of an individual's strengths and weaknesses.

When it comes to predicting functioning in daily life, assessment of general cognition, social cognition and psychiatric symptoms still leaves a considerable amount of variance unexplained at a group level. If clinicians want to predict how an individual will function in daily life, assessment that is aimed directly at the level of daily activities and participation may seem more appropriate. For example, when we are interested in whether a patient will be able to live independently, performance assessment such as having him cook a meal or go grocery shopping may be expected

to give a more ecologically valid picture than a battery of neuropsychological tests. But even though these kinds of diagnostic procedures have considerable face validity, this approach also has considerable drawbacks. First, this would have the risk that instead of assessing a limited number of cognitive functions supposed to underlie activities, a very large range of activities might need to be assessed. This may not be feasible in clinical practice. For a small number of common activities with key importance for independent functioning and indisputable task analyses for proper performance, for example housekeeping, self-care and driving, it could be a good idea. Second, the neuropsychological assessment of individual patients is more than the outcome of a regression analysis based on neuropsychological test performance. As neuropsychologists ideally take careful observations and data obtained during assessment into account to make a prediction of outcome, the relationship between test performance and functioning in daily life is probably much stronger in individual cases than at a group level.

The results of our studies also have implications for the treatment of schizophrenia. Communication needs to be explicit, unambiguous and if possible free of non-verbal cues that are incongruent with the verbal message. Furthermore, non-verbal social cues (e.g. a friendly smile to reinforce adaptive behaviour) need to be paired with explicit compliments. As patients have difficulties in inferring what is going on in others, explicit explanation of another's mental state and how that mental state is influenced by their behaviour may help them. Some patients will also have problems in perceiving their own emotions and mental states. These patients may profit from treatment that focuses on the awareness of emotions and greater empathy to their own and other's feeling, for example emotion focussed therapy (See paragraph 9.2.3).

In addition to the above recommendations our results may also have implications for the cognitive rehabilitation of social cognition. In Chapter 6 studies on the cognitive rehabilitation of schizophrenia were reviewed; there are a number of interventions aimed to improve social cognition or compensating for impairments in this domain (Hogarty, 2004; Van der Gaag, 1992). Although interventions typically lead to an improvement on neuropsychological tests, training does not usually generalise to relevant situations in daily life (Twamley et al., 2003). This may be an effect of impairments in context processing in schizophrenia. Although the interpretation of social cues and the understanding of what is going on in other people's minds may improve from cognitive rehabilitation, the automatic and rapid detection of relevant stimuli will still be impaired. Future interventions may stimulate generalisation by explicitly addressing the context, for example by asking patients to think of comparable social situations they have experienced in the past or to think

of previous reactions of an individual. This will facilitate the retrieval of previously stored knowledge and facilitate the interpretation of behaviour. Furthermore, in addition to traditional cognitive rehabilitation, patients may be taught to regularly scan their environment to detect relevant social stimuli.

Because of impaired social cognition schizophrenia, patients will make mistakes in understanding emotional and more complex mental states of others. This may lead to incorrect attributions of other peoples behaviour (e.g. perceiving less emotions may lead to the attribution that others are not interested). Instead of training perception of emotions and mind reading per se, these dysfunctional attributions could be the focus of treatment. Cognitive behavioural therapy may be a powerful tool here.

9.2.3 *Social cognition: future directions*

In our study on the predictive validity of social cognition for community functioning we used the Social Functioning Scale (SFS; Birchwood et al., 1990). The SFS was chosen because it gives an idea of what kind of, and how many, social activities an individual carries out within a specified timeframe and assesses how far an individual is capable of activities of independent living. This is informative of the activity level and basic competence of an individual. The SFS essentially assesses quantitative aspects of community functioning, therefore it is largely independent of the judgement of a rater. An advantage of the SFS is that behaviour is judged by a proxy-rater, and is therefore not dependent on the level of insight of a patient. Relating quantitative aspects of social functioning and basic competence to social cognition is an important step in understanding how impaired social cognition affects daily functioning. An aspect of social functioning that is not covered by the SFS is the quality of a person's role functioning. As a next step, it would be interesting to include assessment of the quality of community functioning in studies on the relationship between social cognition and social functioning.

Preliminary evidence shows that deficits in Theory of Mind are also associated with poor insight in schizophrenia (Bora et al., 2007; Pijnenborg et al., in prep.). Performance on a first order ToM task, a second order ToM task (Bora et al., 2007) the Faux Pas Task and self-rated empathy (Pijnenborg et al., in prep.) were associated with insight in schizophrenia. According to Bora et al. (2007) a number of explanations arise: first, patients with poor insight may inaccurately attribute threatening thoughts or intentions to others. Second, awareness of a mental illness may be associated with general self-awareness. Patients with impaired insight are hypothesised to be unable to understand other's beliefs about the self: the self will not be evaluated from the perspective of others.

Bora's first explanation relates to the association between insight and paranoid

delusions, but does not explain why these inaccurate attributions would lead to impaired insight. The second explanation is consistent with Amador & David's (2004) model of schizophrenia, which implies that people with schizophrenia and impaired insight will have a more rigid self-image as they profit less from feedback from others. The same process that was suggested as an explanation for the link between social cognition and skills of independent living may play a role here. With regard to the relationship between social cognition and skills of independent living we hypothesised that people with schizophrenia will experience less interpersonal feedback on their behaviour since they do not perceive emotional expressions adequately and show impaired mentalising. Therefore they will be less motivated to demonstrate pro-social behaviour. In the same vein, if patients do not perceive implicit social feedback on their behaviour, they will not infer that it is strange or deviant. This will in turn lead to impaired insight. This idea will need to be elaborated in future studies on the relationship between social cognition and insight.

9.3 COGNITIVE REHABILITATION

In clinical practice the effects of cognitive impairments and negative symptoms in schizophrenia are readily observable, for example in the form of frequent failures to attend appointments. Improper schema selection due to contextual impairments (Hemsley, 2005) probably plays an important role in impaired goal directed behaviour in schizophrenia. Impaired 'willed action' is another factor in schizophrenia that hampers goal directed behaviour. Impaired 'willed action' means that patients are able to react to external stimuli, but have difficulties in self-initiating behaviour (Frith, 1992). Conceptually, impaired goal-directed behaviour can be considered to be part of the dysexecutive syndrome that is often observed in schizophrenia, but also overlaps with the negative symptoms of the disease.

A significant amount of rehabilitation effort has been put into attempts to restore impaired cognitive functions by repeated practice or compensation by strategy training. Since effects of these interventions on behaviour in naturalistic situations are modest, developing an intervention aiming directly at the level of daily functioning seems preferable. Therefore the MEMEX (Memory and Executive functioning) trial was commenced at the Department of Psychotic Disorders of GGZ Drenthe in Assen, the Netherlands. In this trial we examined the efficacy of prompts to stimulate goal-directed behaviour in daily life. A cognitive prosthesis approach in which SMS text-messages sent to a mobile telephone were used to compensate for the lack of goal-directed behaviour in schizophrenia was evaluated. A first pilot study that included eight patients produced promising results: five patients completed the entire trial, of

whom four patients profited from the interventions. Results of this pilot study were promising and the results of a larger scale evaluation (n=62) were comparable. When receiving prompts patients achieved significantly more goals, while performance dropped to baseline after withdrawal of the prompts. With prompting, the overall percentage of goals achieved was 62%, as compared to 40% after the intervention and 47% before. When categories of goal behaviour were examined separately we found that prompting increased presence at individual appointments with mental health workers and participation in leisure activities. Prompting did not have a significant effect on medication adherence, and preliminary evidence suggested that prompting is also not effective in enhancing presence at training sessions and inhibiting undesired behaviour. The majority of the patients enjoyed prompting and wanted to continue after the trial had stopped.

Effects on more remote outcome measures (social community functioning, psychopathology and self-esteem) were also examined. Prompting did not have an effect on social community functioning and self-esteem. It may be that the period of prompting was too short to establish better community functioning. With regard to psychiatric symptoms though, we found that negative symptoms as rated with the PANSS decreased in responders. Apparently, the fact the patients became more active with prompts was also noted by independent raters. When responders were compared to non-responders, we found that latter performed significantly better at baseline perception of facial effect and planning, while baseline memory and negative symptoms were comparable. Other factors such as psychiatric symptoms, insight and initial motivation for the intervention were not associated with success. Furthermore, baseline success rate of responders was significantly worse than in non-responders. This implies that patients who achieved few goals at baseline are also the ones with the poorest planning and emotion perception abilities. Based on this findings we concluded that prompts were successful in compensating for impaired planning. In addition, we speculated that non-successful patients are more sensitive to non-verbal feedback by others and therefore are more motivated to be compliant with treatment, while for successful patients the prompts compensate for the lack of reinforcement in interpersonal interactions. The finding that patients with the poorest emotion perception are also the ones with the poorest everyday functioning at baseline is consistent with the results of Chapter 5, where a relationship between social cognition and community functioning was demonstrated.

9.3.1 *Effectiveness of prompting from an information processing perspective*

Based on Brouwer's version of Norman and Shallice's model (1986) we hypothesised that providing patients with clear and unambiguous prompts would improve their

performance in daily life situations (see Chapter 6). Prompting is hypothesised to compensate for impaired use of contextual information in the detection of relevant stimuli and aims to relieve working memory, prospective memory and executive functioning by offering clear prompts to action. Prompts are subsequently expected to be detected by the monitor, which in turn will mobilise effort and declarative knowledge to needed to make a plan for action, but only if the motivational value of the stimulus is sufficient and if the gap between current state and goal state is not too large. Finally, relevant schemata will be selected and lead to a response. Results showed, however, that although prompting leads to an increase in goal directed behaviour, a substantial number of goals was still missed with prompting. Specifically, prompting was not effective in increasing medication adherence and attendance at the training program. This means that providing patients with prompts is partly effective in overcoming the burden of cognitive impairments, but also that providing clear stimuli alone is not sufficient to optimise goal-directed responses. Given that there was no patient in our study who never obtained a specific goal, it must be concluded that the relevant declarative knowledge and schemata for specific responses were present in all patients.

It is possible that the monitor did not detect the prompts, e.g. when a telephone was forgotten or switched of. Alternative explanations are: 1) patients did not allocate enough effort to the planning of their responses or 2) motivation was insufficient 3) materials needed for the goal behaviour was lacking (e.g the patient did not bring his medication and was not able to collect it within the specified time-frame. Because prompting is effective in increasing goal directed behaviour in some but not in all categories, the nature of the goal must have had an influence on the reaction to the prompt. By letting patients choose their own targets for the intervention, we had hoped to rule out the role of motivation. But as goals were set beforehand, it is not impossible that their motivational value changed over time. Furthermore, patients may have given a socially desirable response when they selected medication and training sessions as goal for the intervention, while intrinsic motivation for these goals was limited. This assumption is based on the observation that the majority of patients spontaneously asked for prompts for appointments, while activities and inhibition were also spontaneously mentioned by a number of patients. Medication and training sessions were less often chosen by patients themselves and more often proposed by a nurse or family member. In the same vein, patients may have been motivated for these goals at a cognitive level (knowing that this would be healthy behaviour), there may have been less “emotional motivation”. This may be because discussing one’s problems with a clinician often has an direct and intrinsic motivational value, while medication may be associated with adverse side effects and

not with direct gains. Finally, the stigma that is associated with taking anti-psychotic medication may have hampered an increase in adherence by prompting.

To overcome the effects of a lack of motivation to accomplish a goal, combining motivational interviewing with a cognitive prosthesis was suggested in Chapter 8. In motivational interviewing a discrepancy between actual behaviour and personal goals is developed to facilitate a behavioural change. Techniques that are used are, for example, expressing empathy, believing in the patient's abilities and letting a patient sum up the pros and cons of his behaviour. This technique is successful in promoting behavioural change in substance abusers. The efficacy of motivational interviewing to enhance medication adherence in schizophrenia is examined in an ongoing trial by Staring et al. (2006). Another possibility is that not enough effort is generated to activate schemas. In other words, negative symptoms may have been too severe to be overcome by prompting. Re-structuring a patient's environment so that the amount of effort that is needed for the planning is minimised (e.g. putting medication always on the same place) may be a solution here.

9.3.2 *Optimising the effect of prompting: the role of insight*

Insight has been identified as an predictor of outcome in schizophrenia (e.g. Lysaker et al., 2007). According to David's definition of insight in psychosis (1990), medication adherence is one of the factors involved in insight, the other two are awareness of the illness and correctly re-labelling psychotic symptoms. In our intervention, an association between insight in psychosis and effectiveness of the prompts was not found. This is surprising, given that treatment adherence was the most important outcome measure of our study. It is possible that the measure of insight used in our study (PANSS-item G12) was not sensitive enough to detect inter-individual difference in insight, as one item will not be representative for the three dimensions of insight.

Given the conceptual overlap, it is reasonable to assume that interventions aiming to improve insight will have a positive effect on treatment adherence. When treatment adherence is addressed directly in therapy, its effects on behaviour are expected to be straightforward. Interventions that focus on the other two dimensions of insight are also expected to have an indirect effect on treatment adherence, although this will not be a one-to-one relationship (being aware of having an illness does not necessarily equals being motivated to take medication).

A number of interventions have been evaluated with variable results. Atypical anti-psychotic medication has a small positive effect on insight (Henry & Ghaemi, 2004). Other interventions that, although often not explicitly, address insight are cognitive behavioural therapy (e.g. when voices are relabelled as harmless

symptoms of the disease) and psycho-education. Behavioural interventions that are explicitly aimed at insight in psychosis are few. Turkington et al. (2002) developed a treatment protocol encompassing psycho-education, cognitive behavioural therapy and modulating dysfunctional schemata. This intervention had a positive effect on treatment adherence and re-labelling of psychotic symptoms.

These psychological interventions were discussed in the previous paragraph mainly focus on conscious cognitive processes. Besides conscious cognitive processes, more implicit emotional processes are also disturbed in schizophrenia (Aleman & Kahn, 2005). Amador and David (2004) argue that impaired insight in schizophrenia is associated with a positive bias in the implicit processing of self-related information. This positive bias causes an unrealistically positive self-image where it concerns mental health. Such a positive bias is also found in healthy people. Normally rational and explicit processing of self-related information overrules this positive bias, but people with schizophrenia often lack the energetic resources and cognitive abilities for these effortful processes. In addition, processing of self-related information is thought to be more rigid and less changeable by external feedback in people with schizophrenias with impaired insight. Based on this assumption a new intervention to enhance insight in psychosis is currently being developed (Pijnenborg & Aleman, in prep.). Different from previous interventions, this treatment focuses on emotional awareness and emotion regulation. The intervention is based on Greenberg's (2002) Emotion Focused Therapy. By using experiential techniques patients will be taught to experience and deal with negative emotions that are associated with having a severe mental illness. Besides emotional awareness and regulation, the incorporation of feedback from others, self-reflection and mental flexibility will also be addressed.

Techniques that aim to enhance insight are expected to enhance motivation for the intervention. Combining interventions focussed on insight with prompting will probably be a very strong combination, as two factors that hamper goal directed behaviour are addressed simultaneously. Insight focussed therapy will enhance motivation for treatment, while prompting compensates for poor executive functioning.

9.3.4 *Prompting: clinical implications*

Clinicians may be interested in the use of prompts to enhance treatment adherence. As SMS-text messages are a relatively cheap and straightforward way to prompt patients, they are suitable for a broader application and may be used for increasing the number of appointments with mental health workers that are actually attended.

Cognitive rehabilitation is of course not synonymous with simply enhancing pharmacological treatment adherence. Cognitive rehabilitation should be tailored

to individual needs by supporting patients to set goals that are relevant for their everyday life. Sending prompts to increase therapy adherence without the patient being motivated for treatment goals will not be very effective. When non-adherent patients receive SMS-text messages to remind them of their medication, one cannot assume they will be intrinsically motivated and large inter-individual differences in motivation will exist. Without sufficient motivation patients will not react adequately to the prompts, as has probably been the case in our own study with regard to medication and training sessions. To deal with this lack of motivation, combining prompts with motivational interviewing was suggested in Chapter 8.

The intervention in its current form will be effective in enhancing presence at appointments with mental health workers and leisure activities, at least in patients who explicitly choose to be prompted for these goals. Furthermore, patients that will benefit most from the intervention are patients with relatively poor baseline behaviour and poor planning abilities and perception of facial affect. Of course, the sample size of our evaluation is relatively small. Therefore the suggestions that are provided here should never lead to the exclusion of individual patients with impaired goal directed behaviour from the intervention.

As the positive effect of prompting disappeared again after the intervention, prompting over a longer time is necessary. SMS-text messages can be equated with other prostheses such as glasses or a wheelchair: the prosthesis is helpful in compensating for deficits but its efficacy is entirely dependent on actual use. Therefore, in future studies a cognitive prosthesis that enables patients to confirm they received, and have acted on the prompt may be useful. Without this confirmation, the prompt could be repeated.

In general, patients in the study reported that they enjoyed the prompts. When the study started five years ago, many patients were not familiar with the use of mobile telephones. Therefore we developed a short training in the use of mobile telephones. As the study progressed, more and more patients were able to use their mobile telephones without training. In the last two years of the study, none of the patients needed telephone training. This supports our idea that mobile telephones are very user friendly; only one patient dropped out of the study because he was not able to learn how to use a mobile telephone due to his cognitive impairments. Both mobile telephones and websites that support the sending of SMS text-messages are readily available commercially. Furthermore, when the intervention is considered in the light of the high costs of failures to attend individual appointments, it is relatively cheap.

To conclude, SMS text-messages may not be the complete solution for impaired goal directed behaviour, but they help patients to attend more individual appointments

and carry out more activities. In combination with the relatively low cost, it seems worthwhile to include prompting with SMS text-messages in the standard care for people with schizophrenia. As many patients usually have their own mobile telephones, teaching them to use the diary function of their own mobile phone is also an option. This makes more demands on the patients' own initiative and is therefore more susceptible to the effects of cognitive impairments. This problem could easily be solved if nurses or family members are willing to help a patient to enter his or her schedule into the diary of the mobile telephone.

9.3.4 *Prompting: future directions*

In our study the majority of the participants were inpatients. If they missed a number of appointments with mental health workers, mental health workers came to visit them. Also, if they did not take their medication within a specified timeframe nurses often still prompted them. The number of outpatients included in the study was relatively small. For many outpatients with schizophrenia goal-directed behaviour is, of course, also impaired, so it would be interesting to study the effect of prompting in a larger sample of non-adherent outpatients.

Furthermore, in addition to mobile telephones other technological devices may also be applied in the cognitive rehabilitation of schizophrenia. For example, palm tops or electronic organizers may be used as memory aids. More interactive prompts, such as phoning the patient before an appointment, may also be an option.

9.4 CONCLUDING REMARKS

In schizophrenia research, there is often a discrepancy between clinical practice and scientific research. This thesis is an attempt to bridge this gap by focusing on the impact of cognitive impairments in daily life. Working as a researcher in clinical practice can be the best of two worlds. Theoretical concepts can be readily translated into research aimed at the level of patients daily functioning. Also, the behaviour of individual patients is always a source of inspiration for new theories.

However, intervening in people's daily life and measuring the effects of an intervention on every day functioning can be challenging. Determinants of behaviour in daily life are numerous and the functioning of individuals is often unpredictable. Therefore, measuring everyday performance is complicated and demands a lot of effort. These efforts are more than worthwhile, however, when everyday day functioning of people with schizophrenia truly improves.

