



On Mindfulness and Autism
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Children with autism spectrum disorder (ASD) are characterized by having social communication and interaction deficits, as well as repetitive and restricted behavior patterns or interests. Comorbid disorders are common; 70% of children with ASD meet the criteria for at least one comorbid disorder, such as anxiety disorders, depression, attention-deficit/hyperactivity disorder (ADHD), and oppositional defiant disorder (ODD). The symptoms of children with ASD are highly demanding for their parents as well, reflected in the high rates of parenting stress and mental health problems in parents of children with ASD. The aims of this dissertation were to investigate if, for what, and how a mindfulness-based program (MBP) could benefit children with ASD and their parents.

We used multiple methods to investigate these objectives. In *Chapter 2* we used a randomized experiment to investigate whether practicing mindfulness can increase empathy, including mind reading, empathic responding, and prosocial behavior. Adults from the general population, aged 18 – 44 years, were randomized over a 5-minute mindfulness meditation, a relaxation, and a mind wandering exercise. In doing so, we investigated whether the effects of a brief mindfulness meditation on empathy were due to mindfulness-specific mechanisms or due to stress-reduction approaches in general. The results of this study showed no effect of the brief mindfulness meditation relative to both control conditions on mind reading, empathic responding, and prosocial behavior. Also, we investigated whether the effects depended on autistic or narcissistic traits. The results indicated that the effects of the brief mindfulness meditation were independent of autistic traits. Unexpectedly, people higher in autistic traits did show increased prosocial behavior across conditions. The effects of the brief mindfulness meditation did depend on narcissistic traits. Opposite to our expectation, the mindfulness exercise improved mind reading in people with low levels of narcissistic traits, but reduced it in people with high levels of narcissistic traits, as compared to the relaxation and mind wandering exercise. The findings of *Chapter 2* implied that a brief mindfulness exercise may be insufficient for raising empathy.

In the next chapters the MYmind program was investigated. This is a 9-week MBP with parallel group-based sessions for youngsters with ASD and their parents. The program cultivates present-moment attention, non-judgmental awareness of inward and outward experiences (such as bodily sensations, thoughts, feelings, and sounds), and responding with awareness to distressing and difficult experiences instead of reacting automatically. Each session included psychoeducation about the session theme, mindfulness meditation practices, informal practices to apply during daily living, inquiry about the practices, and discussions about the home practices.

In *Chapter 3* we used a repeated measures study design to investigate if and for what outcomes the MYmind program was beneficial for children with ASD and their parents. Participants were 45 children with ASD, aged 8 – 19 years, and their parents. Children and parents reported on their social responsiveness, emotional and behavioral functioning, mindful awareness, and parenting on four different occasions, i.e., pre-intervention, post-intervention, at 2-month follow-up, and 1-year follow-up. Results showed that children's social responsiveness problems decreased and their emotional and behavioral functioning improved, but their mindful awareness did not increase. Improved emotional and behavioral functioning included decreased internalizing, externalizing, attention problems, rumination, and stress, and increased emotional well-being. Children reported most substantial effects 2 months after the MYmind program had ended, and improvements remained up to 1 year later only for externalizing problems, attention problems, and emotional well-being. Parents, however, reported child improvements in social responsiveness and emotional and behavioral functioning also post-intervention and at 1-year follow-up. Parental internalizing and externalizing problems were decreased

at post-intervention, 2-month, and 1-year follow-up, and their attention problems and stress were decreased at post-intervention and 2-month follow-up. They also reported decreased parental overreactivity and stress about their competence in parenting, and increased mindful parenting and self-compassion directly after the intervention, 2 months later, and 1 year later. These results were mostly supported by a qualitative analysis of the answers of children and parents on open-ended questions about their experienced changes. Three main themes emerged: (1) *Mindfulness skills* with the two most frequent subcategories awareness and applying meditation; (2) *Improved well-being* with the three most frequent subcategories improved parent-child interaction, calmness, and coping with difficult experiences; and (3) *Little to no changes* which appeared a relatively small theme compared to the other main themes. The results of this study indicated that the MYmind program with parallel sessions for children and parents could improve ASD symptoms, common comorbid symptoms, parental mindfulness and mental health, and parenting.

In *Chapter 4* we investigated whether children with ASD showed atypical attention compared to typically developing (TD) children, and whether the MYmind program could improve the attention systems of children with ASD. Forty-nine children with ASD, aged 8 – 23 years, completed the Attention Network Test (ANT) pre-intervention, post-intervention, and at 2-month follow-up. Fifty-one TD children completed the ANT on two measurement occasions. This control group was matched on age, gender, and educational level, and did not follow the MYmind program. The results showed that the children with ASD did not differ from the TD children in the speed of the attention systems, but they were somewhat less accurate in their orienting and executive attention. The children with ASD performed less accurate on both orienting trials, and trend effects indicated a weaker executive accuracy as compared to TD children. In addition, no significant interaction between group and time on the attention systems was revealed. This indicated no effects of the MYmind program on the attention systems. However, a trend effect implied that children with ASD were less accurate in their executive attention as compared to TD children at pre-intervention, whereas this difference was no longer present at post-intervention. Also, a trend effect implied an improved orienting attention in children with ASD at 2-month follow-up, but not in TD children at posttest. These improvements indicated small effects of the MYmind program on executive and orienting attention.

In *Chapter 5* a qualitative study was presented in which we explored how mindfulness works for families with ASD, examining the research question which change processes are involved in the MYmind program according to the experiences of the children and parents. Fourteen children, aged 9 – 17 years, and 31 parents participated in an interview about their experiences with the training, experienced changes, and how mindfulness works for them. Interviews were held 2 to 5 months after the MYmind program had ended. We used grounded theory with a constructivist approach to develop a theory of the key change processes and their relations. Eight main change processes resulted from the analysis, namely *connecting with peers*, *pausing*, *being aware*, *being in the here and now*, *letting be*, *determining a strategy*, *being and responding calm*, and *attuning to others*. The parents described these processes more in depth than the children. Also, several children mentioned they did not experience much change. We constructed a model that reflected how the eight processes were interconnected and flowed into each other. For example, participants described that in a difficult situation they paused by doing a short meditation, then became aware of the situation and their reaction to it, then let the situation be as it was, or determined a strategy on how to respond, and then responded calmly. The findings deepen our understanding how multiple change processes are involved in the MYmind program for children with ASD and their parents.

In *Chapter 6* we conducted a series of single-case studies to investigate the effects of the MYmind program for adolescents with ASD and comorbid internalizing disorders, using a person-centered approach with a multiple baseline design. Five adolescents with ASD and a comorbid internalizing disorder, aged 14 – 19 years, participated. They took part in an individual-based MYmind program, without parallel sessions of mindful parenting. The adolescents and one of their parents completed a daily questionnaire during a baseline phase, the intervention, up to 2 months after the intervention had ended, and for 2 weeks 1 year after the intervention had ended. The daily questionnaire included items on personal goals about their distress and internalizing symptoms, and on the potential processes of change variables mindfulness practice time, present-moment attention, friendliness for self and others, worry, rumination, stress, and sleep. We used visual inspection and simulation modeling analysis to analyze the data on adolescents' personal goals. In addition, we investigated how changes in these personal goals were related over time to the potential processes of change. The results showed variation across the five cases. One adolescent reported improvement in his personal goals, namely increased positive thinking and decreased negative thinking, but this was not confirmed by his parent's reports. Three adolescents improved on part of their personal goals, as reported by themselves or by their parent. One adolescent reported deterioration, namely increased worried feeling and decreased confident feeling, during the intervention and 2-month follow-up. However, his goals did not deteriorate according to his parent, and had improved at the 1-year follow-up. Results on the processes of change indicated that decreased worry preceded behavioral improvements in personal goals for two adolescents. Decreased stress and increased mindfulness practice time preceded improvement on personal goals only for one of them. These findings indicated that most of the adolescents with ASD and a comorbid internalizing disorder partially benefitted from the MYmind program.

Overall, the findings of the present dissertation suggest that cultivating mindfulness could support families to cope with ASD and its associated difficulties. Children's social responsiveness problems and comorbid internalizing and externalizing symptoms were decreased after the MYmind program, and parental mental health and parenting were improved. Children and parents experienced multiple processes leading to change. However, the strength of the evidence so far stands in an initial stage, and the positive effects had limited support in terms of an objective assessment of attention. In addition, not all children seemed to benefit from the MYmind program. Based on the findings of the present dissertation, future research could investigate the specificity of the effects of an MBP for children with ASD and their parents, systematically investigate potential factors that could influence the effects of the program, and take the next step in investigating how an MBP benefits children with ASD and their parents.