Working your way through self-esteem

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Working your way through self-esteem

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Chapter 1

Introduction

Background

Transitioning from childhood to adulthood can be a challenge for youngsters. An array of developmental tasks lies on this path, such as exploring and developing an identity, forming intimate relationships, taking on education, finding a job matching one's capabilities and needs, and perhaps moving out to a place of your own. The genetic make-up of the individual, life circumstances, and personality characteristics all interact in going through these developmental tasks, which may not always run smoothly. Adolescence is actually seen as a period of high risk for the emergence of serious mental disorders (Singh, 2009) and the majority of mental disorders emerge before the age of 25 (Kessler et al., 2005). Specifically, the proportion of individuals with onset of any mental disorder before the age of 14 was found to be 34.6%. For 62.5% of individuals the onset was before the age of 25, with a peak age of onset at 14.5 years (Solmi et al., 2022). In accordance, across the lifespan, youth between 12-25 years of age show the highest incidence and prevalence of mental disorders, and 50% of the total disease burden in this age range is accounted for by mental disorders (Gore et al., 2011; Pieris-Caldwell et al., 2007). Thus, in order to prevent a prolonged duration of untreated illness and poorer clinical and functional outcomes, all associated with an early of age of onset of mental disorders (de Girolamo et al., 2012), early intervention in youth mental health is of uttermost importance and proven to be able to be delivered effectively (Corell et al., 2018; McGorry, 2015; McGorry et al., 2018). In sum, the aforementioned emphasizes the need for (early) intervention, focusing on the crucial developmental period of 15-25 years, to enhance mental health, well-being, and productivity of young people (McGorry et al., 2014).

Early intervention research found that in youth symptoms often fluctuate in severity, sometimes at subthreshold level (Jones, 2013; Kessler et al., 2007; van Os, 2013; Yung et al., 1996). This, in addition to viewing mental health as a spectrum and acknowledging high rates of co-morbidity and variety in symptom presentations, corresponds to the development of a transdiagnostic framework, e.g. the Hierarchical Taxonomy of Psychopathology (HiTOP) (Kotov et al., 2017; Ruggero et al., 2019), stating symptoms of psychopathology to be transdiagnostic (van Os, 2013) and to lead to a wide range of psychopathology later in life (van Os & Reininghaus, 2016; McGorry & van Os, 2013). Further, youth mental health is characterized by a high level of co-morbidities, namely 60% when referring to the presence of more than one mental health condition (Pottick et al., 2014) up to 98% when also including other psychosocial or environmental problems or needs (Social Exclusion Unit, Office of the Deputy Prime Minister, 2004). In aid of navigating through this high degree of complexity and variety in the development of psychopathology, early intervention research established criteria to identify individuals at high risk of developing psychotic disorders (Fusar-Poli et al., 2013; Miller et al., 2002; Yung et al., 1996), also referred to as individuals presenting with an At-Risk Mental State (ARMS) that may dissolve, persist, or

transition into a wide range of psychopathology (Yung et al., 2005). Fusar-Poli et al. (2020) recently reported on the amount of ARMS individuals who develop a psychotic disorder over time, with a mean transition rate of 22% at a mean follow-up of 3 years. Regarding this transition, research shows that experiencing childhood adversity is, among more, a risk factor for transitioning from ARMS to first-episode psychosis (FEP) (Bechdolf et al. 2010; Mayo et al., 2017). This is in accordance with an abundance of literature positing that the experience of childhood adversity increases the chances of developing psychopathology later in life (Kessler et al., 2010; Matheson et al., 2013). Correspondingly, help-seeking youth with an at-risk mental state report high levels of childhood adverse events such as emotional, physical, and sexual abuse, and emotional and physical neglect (Chen et al., 2010; Varese et al., 2012). Namely, 75% up to 87% report to have experienced at least one type of childhood adversity (Kraan et al., 2015a, 2015b).

To understand the direct and later effects of childhood adversity on the development of psychopathology, research has proposed that low self-esteem plays an important role in these pathways (Brown et al., 2008; Garety et al., 2007). It is now well established, from a variety of studies, that low self-esteem is assumed to potentially negatively impact mental health, as well as maintain psychopathology (Donald et al., 2019; Garety et al., 2007; Silverstone & Salsali, 2003; Zeigler-Hill, 2011). Further, self-esteem is considered to fluctuate over time (Kernis, 2005). Within the field of psychosis research, Myin-Germeys et al. (2000) addressed the relevance of variability as an emotional processing mechanism. Further, Bentall et al. (2001) underscored the need for a model that takes into account the lack of stability in self-esteem (Bentall et al., 2001). Ecological momentary assessment (EMA) aims to sample and examine experience and behaviour in daily life with multiple measurements per day (Myin-Germeys et al., 2016), and thus facilitates the measuring of variability during the day.

Taken together, these findings suggest that transdiagnostic interventions that target the putative mechanism of self-esteem in youth may constrict the effects of childhood adversity on the development and maintenance of psychopathology later in life.

Ecological Momentary Interventions

The current offering of psychological interventions shows difficulties in reaching youth effectively due to several barriers (Singh et al., 2010; van Amelsvoort, 2013) and furthermore, has limited efficacy under real-world conditions, stressing the need for alternative approaches. In recent years, mobile health (mHealth) has increasingly developed to increase the accessibility of psychological interventions for youth (Dinesen et al., 2016). Many smartphone applications are available in major app stores to relieve psychological

stress and enhance mental well-being. However, robust trials to test the efficacy of such applications remain scarce (Baumel et al., 2020), and the use of proven effective cognitive behavioral interventions in these apps is limited (Garrido et al., 2019). An ecological momentary intervention (EMI) could be seen as a form of mHealth. The development of EMIs is rooted in ecological psychology, coined as aiming to examine experience and behavior situated in daily life through EMA (Myin-Germeys et al., 2016). EMIs additionally assume that it is key to change behavior in daily life (Schulte-Strathaus et al., 2022). This enhances the generalizability and ecological validity of delivered interventions and furthermore, an EMI is able to intervene in moments most needed (Heron & Smyth, 2010). Consequently, EMIs have been developed for a range of psychopathology, such as mood disorders (Burns et al., 2011; Wahle et al., 2016), anxiety disorders (Pramana et al., 2018; Silk et al., 2020), substance use disorders (Blevins et al., 2021; Businelle et al., 2020; Shrier et al., 2018), and for delivering transdiagnostic interventions (Myin-Germeys et al., 2021; Reininghaus et al., 2023). In contrast to the great number of aforementioned smartphone applications in app stores, many EMIs are enhanced by the use of evidence-based approaches. However, there still is a limited number of studies rigorously researching the effect of EMIs (Balaskas et al., 2021; Goldberg et al., 2022; Smith & Juarascio, 2019).

The SELFIE trial

The notion of experiencing childhood adversity impacting mental health through a pathway of self-esteem, and insufficiently reaching individuals in such a crucial time of development, led to the initiation of the SELFIE trial. This is a study aimed at investigating the efficacy and clinical feasibility of a smartphone-based guided self-help intervention to improve self-esteem in youth (12-25 years) exposed to childhood adversity (i.e. abuse, neglect, bullying, and household discord), in a multi-center, parallel-group, assessor-blind randomized controlled trial (RCT) (Daemen et al., 2021). This EMI under study was manualized and delivered by trained SELFIE therapists, consisted of three face-to-face sessions, and three e-mail contacts, and was administered through a smartphone-based app (i.e., the Psymate® app). It supported the adaptive real-time and real-world transfer of intervention components tailored to moment, person, and context. It thereby provided an ecologically valid, accessible, and personalized transdiagnostic intervention aimed to tailor to the needs of youth (Heron & Smyth, 2010; Myin-Germeys et al., 2016; Reininghaus et al., 2016). The SELFIE intervention components were based on the self-help approach by De Neef (2010). What is not yet understood, given the lack of research, are the precise working mechanisms of an EMI. Specifically, it is not yet clear whether the 'effective intervention ingredients' of conventional interventions hold when an intervention is delivered as an EMI. In the context of the development and increasing use of mHealth

we should be aware of specific mechanisms, in the present dissertation relating to self-esteem, to effectively develop interventions.

Aim and outline of the dissertation

The current dissertation set out to gain a further understanding of self-esteem in the context of psychopathology and mental well-being and has been divided into three parts.

Chapter 2 begins by laying out the specific characteristics of help-seeking youth between 15 and 25 years facing mental health problems, by describing both the working method of an innovative Youth Mental Health team in the Netherlands, as well as the clinical characteristics of its population.

The second part presents the findings of EMA research on self-esteem in the course of psychopathology. Namely, **Chapter 3** analyses the associations between momentary self-esteem, fluctuations in momentary self-esteem, and psychotic experiences in daily life in an experience-sampling study of individuals with FEP, individuals with ARMS, and controls. In addition, **Chapter 4** reports whether childhood abuse (emotional abuse, physical abuse, sexual abuse, and amount of exposure to different types of abuse) modified the association between momentary self-esteem and psychotic experiences in daily life, in FEP, ARMS, and controls.

The final part of this dissertation concerns an EMI targeting self-esteem. This EMI under study in the SELFIE trial is presented in **Chapter 5** in the form of the SELFIE trial protocol. **Chapter 6** analyses the results of interviews and focus groups undertaken during a realist evaluation. The aim of this realist evaluation was to gain an understanding of mechanisms leading to desired outcomes of the SELFIE intervention related to self-esteem, and under what circumstances these mechanisms do or do not come into play. The importance of investigating the working mechanisms of an EMI, alongside testing its efficacy, is highlighted in **Chapter 7** and aims to add to the composition of limited theories on EMI available to date.

The general discussion in **Chapter 8** provides an overview of the most important findings from the reported studies. These findings and our experiences subsequently support reflections on the research methods used, future directions for research and on clinical implication.

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Chapter 2

No boundaries: a 2 year experience in a specialized youth mental health care program in the Netherlands

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Abstract

Aim

Young people around the age of 18 receiving mental health care usually face the transition a from child and adolescent (CAMHS) to adult mental health services (AMHS) bringing the risk of disruption in continuity of care. Recognizing the importance of early intervention in this vulnerable life-period, this study aims to emphasize the importance of a client-centred approach and continuity of care for this age group. For a deeper understanding of the specific needs of this group, the working method of a Dutch youth mental health (YMH) team working in a secondary mental health care setting is described, including some clinical characteristics and treatment results of patients who accessed this service.

Methods

Data consist of a detailed description of the working method of the YMH team combined with clinical characteristics of all patients aged 15-25 years accessing the services of the YMH team over a two-year period.

Results

The YMH team incorporated suggestions of earlier research into a client centred treatment. Key elements were multidisciplinary meetings, transcending diagnosis, flexibility and collaboration with other care providers. Clinical records showed a complex patient population and significant treatment effect.

Conclusions

The group of emerging adults accessing the YMH team can be described as a patient group with a high diversity and complexity of disorders and problems. Continuity of care was met when patients turned 18, allowing treatments to be successfully performed by the same team of professionals using a client-centred approach.

Introduction

Adolescence forms a period of high risk for the emergence of serious mental disorders (Singh, 2009). Approximately three-quarters of mental disorders emerge before the age of 25 (Kessler et al., 2005). Young people (aged 12 to 25) have the highest incidence and prevalence of mental disorders across the lifespan, and indeed mental disorders account for almost 50% of the total disease burden among young people (Pieris-Caldwell et al., 2007). Correspondingly, there is a growing body of literature that recognizes the importance and effectiveness of early intervention in youth mental health (Correll et al.,2018; McGorry, 2015; McGorry et al., 2018).

The comprehensive mental health action plan 2013–2020 (World Health Organization, 2013) provides a framework for strengthening capacities in countries to address the mental health needs of children and adolescents. It encourages the adoption of a life-cycle approach in implementing mental health policies and strategies, taking into account the health and social needs at all stages of the life course. However, in many countries the mental health care system is rigidly divided into child and adolescent mental healthcare (CAMHS) and adult mental health care (AMHS). Transfer from CAMHS to AMHS usually takes place at 18 years. This division cuts right through the life-stage for youth as defined by the WHO, namely 15-25 years. A British multicentre study (Singh et al., 2010) even revealed that for the vast majority of service users, the transition from CAMHS to AMHS was poorly arranged, poorly carried out, and poorly experienced.

Bearing in mind the specific needs of youth, it should be noted that during this period, brain development has distinct features and plays a crucial role in further development. Longitudinal neuroimaging studies demonstrate that the adolescent brain continues to mature well into the 20s (Blakemore & Robbins, 2012; Johnson et al., 2009). This dynamic process influences behaviour and in this specific life-stage, decision-making and behaviour are highly dependent on the social and motivational context (Crone & Dahl, 2012).

Another characteristic of youth is that it is difficult to predict future development of mental (ill) health. Symptoms often fluctuate in severity, sometimes at a subthreshold level (Jones, 2013; Kessler et al, 2007; Yung et al., 1996), making it hard to diagnose a specific mental disorder. In addition, co-morbidities are highly prevalent, with percentages ranging from 60%, when referring to the presence of more than one psychiatric disorder (Pottick et al., 2014), to as much as 98%, when including also other presented psychosocial or environmental problems or needs (Social Exclusion Unit, Office of the Deputy Prime Minister, 2004). These characteristics show a high degree of complexity and variety in the development of psychopathology.

In sum, the above emphasizes the potential of (early) intervention, focussing on the crucial developmental period of 15-25 years, to greatly enhance mental health, wellbeing and productivity of young people (McGorry et al., 2014). Virenze, a mental health care organization in the Netherlands, aimed to do so and established a multidisciplinary youth mental health (YMH) team in Maastricht. Within the context of emerging integrated youth health care worldwide (Hetrick et al., 2017), the YMH team brings together CAMHS and AMHS, providing secondary care (Tier 3) (Appleton, 2000) including treatment of complex conditions.

This paper aims to gain a better understanding of the specific needs of help seeking youth between 15 and 25 years facing mental health problems, by describing both working method of the innovative YMH team and clinical characteristics of its population. To explore the effectiveness of the YMH team, treatment effects are analysed. By contributing to ongoing evaluation and program description within youth mental health care, the present paper is of importance in supporting systems transformation.

Methods

Subjects

Clinical characteristics of 158 patients aged 15-25 years who had been referred to the YMH team in Maastricht by their general practitioner, school doctor, or other health care professionals, were collected from the patient files. Data were collected retrospectively for a two-year timeframe; between July 2013 (start of the team) and June 2015. The data set was anonymous. The local internal scientific committee approved of the study.

Working method of the team

The YMH team can be described as a hybrid multidisciplinary team consisting of professionals from CAMHS and AMHS, and with different fields of expertise. The team included psychologists, psychotherapists, family therapists, psychiatrists, running therapist and a psychiatric nurse practitioner, to ensure comprehensive care and meeting complex needs. Fields of expertise comprised Cognitive Behavioural Therapy (CBT), Eye Movement Desensitization and Reprocessing (EMDR), Schema Focused Therapy, Systemic therapy, Psychoanalysis, Mindfulness-Based Cognitive Therapy (MBCT), Acceptance and Commitment Therapy (ACT), Pharmacotherapy and sessions aimed at gaining competences (regarding ADHD or emotion regulation disorders). These therapies were offered individually and/or in a group setting. The YMH team provided both brief, less intense treatment as well as specialized treatment, or a combination of both. At weekly multidisciplinary meetings with a cross-developmental stage and trans-diagnostic

approach led to a personalized treatment plan per patient. Different professionals within the team worked together to execute and evaluate the specific treatment plan, and if needed (mental health care) partners from other (primary care) facilities were involved. The YMH team hereby adhered to a client-centred approach. Continuity of care was met when diagnoses or patient needs changed or when patients turned 18, allowing the complete treatment to be performed by the same, multidisciplinary team of professionals.

Measures

Patient sociodemographic characteristics comprised sex and age. Clinical characteristics comprised diagnoses according to the Diagnostic and Statistical Manual of mental disorders (DSM-IV-TR) (American Psychiatric Association, 2000) on axis I, II and IV. DSM-IV-TR diagnoses and Global Assessment of Functioning (GAF) (American Psychiatric Association, 2000) scores were assessed by the clinician using the Structured Clinical Interview for DSM-IV-TR axis I and/or II disorders (SCID-I and/or II) (First et al., 2002; First et al. 1997) and if indicated, further instruments such as the Diagnostic interview for ADHD in adults, version 2.0 (DIVA 2.0) (Kooij & Francken, 2010) and Autism diagnostic observation schedule, second edition (ADOS 2) (Lord et al., 2012) were conducted. To assess the intellectual capacity if indicated, the Wechsler Adult Intelligence Scale IV, Dutch version (WAIS-IV-NL) (Pearson assessment & information BV, 2012b) was used, which is shown to be a reliable and valid instrument (Pearson assessment & information BV, 2012a).

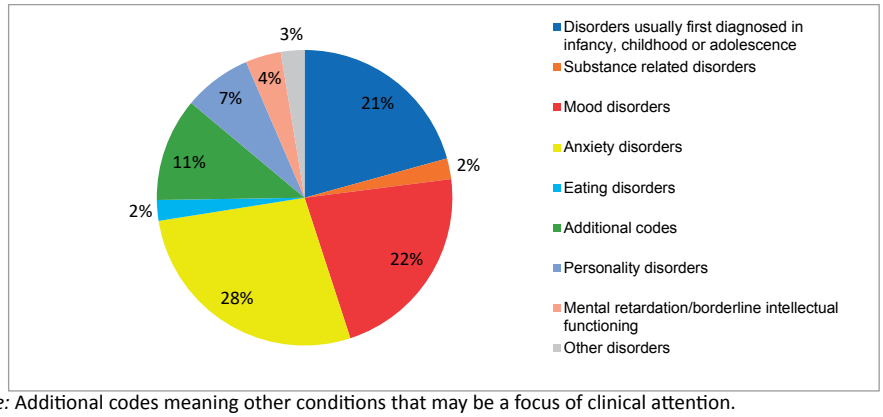
To explore treatment effects, pre- and post- treatment Routine Outcome Measurement (ROM) as well as GAF scores were used. In the Netherlands, ROM is part of standard care to determine symptom reduction aiming to measure treatment effect. The Brief Symptom Inventory (BSI), the 53-item version, (Derogatis, 1993) is a standard ROM which uses patients' self-reports, validated for individuals from 18 years onwards. All measures were administered in Dutch.

Procedure and analysis

Clinical data mentioned above were extracted from the patient files, compiled and analyzed statistically using IBM SPSS Statistics software for Windows, version 23.0 (IBM Corp., Armonk, N.Y., USA). Firstly, to investigate clinical characteristics, frequencies were run on all disorder categories. To explore treatment effect, a repeated measures design was used comparing patients' symptoms and functioning at the beginning and end of treatment by performing a paired samples *t*-test on pre- and post- BSI (mean score) and GAF measures. Furthermore, to investigate if there is a specific need for care based on sex, a split-plot ANOVA was conducted with sex as the independent variable and pre and post BSI scores as repeated measured dependent variable. The same was done for GAF as dependent variable. For all analyses, statistical significance was set at $P < .05$.

Results

Between July 2013 and June 2015, the YMH team saw 158 patients with a mean age of 19 years when first accessing the team (range 15 – 25 years, SD = 2.40). For 139 patients, including 55 males and 84 females, diagnoses were available. The most common clinical disorders were anxiety disorders, mood disorders, and disorders usually first diagnosed in infancy, childhood or adolescence (Figure 1). Anxiety disorders were somewhat distributed over the different disorders within this category, with generalized anxiety disorder and posttraumatic stress disorder occurring more often. Among mood disorders mainly depression was found. Of the disorders usually first diagnosed in infancy, childhood or adolescence, ADHD diagnoses were by far the most common, making up about two thirds of these diagnoses. Missing diagnoses were due to deferred decisions or end of treatment before the diagnosis was finalized.



Note: Additional codes meaning other conditions that may be a focus of clinical attention.

Figure 1. Distribution of all axis I and II disorders in patients from the Youth Mental Health team. Percentages are based on the frequency of diagnoses within the category divided by the total of all diagnoses.

About 7% of patients were diagnosed with a personality disorder, including cases of axis II comorbidity. It should be noted that in 48 cases there was a deferred diagnosis, typically on axis II, additional to a disorder already diagnosed. About 66% of the patients had more than one clinical disorder, and when including axis IV co-morbidity, this percentage even reaches 98%. On average patients received 2.22 clinical diagnoses plus 1.83 diagnoses on axis IV.

As shown in Table 1, almost all patients presented axis IV problems, and almost half of all patients showed two or more factors. The two most common axis IV factors, each seen in about two-thirds of the patients, were educational problems and problems with a primary support group. A considerable number of patients, almost 10%, was found to have a low

IQ and received the diagnosis of mental retardation or borderline intellectual functioning for the first time.

Table 1. Factors on axis IV present in the patient group

Factors on axis IV	Total of patients	Patients (%)	Total of diagnoses	Diagnoses (%)
Any psychosocial and environmental problem	129	92,81	244	
Problems with primary support group	85	61,15	85	33,46
Problems related to the social environment	29	20,86	29	11,42
Educational problems	89	64,03	89	35,04
Occupational problems	17	12,23	17	6,69
Housing problems	6	4,32	6	2,36
Economic problems	13	9,35	13	5,12
Problems related to interaction with the legal system/crime	2	1,44	2	0,79
Other psychosocial and environmental problems	3	2,16	3	1,18
No diagnosis/factor on axis IV	10	7,19	10	3,94

Note. Percentage reflects occurrence of factor/problem in patients of the Youth Mental Health team. Numbers add up to more than 100% due to co-morbidities.

By June 2015, 116 patients were no longer in treatment. From 93 patients begin and end measures of GAF scores were available. Missing end scores are mostly explained by patients deciding to discontinue treatment, or due to unforeseen factors like for example moving. A paired samples t-test indicated that there was a significant difference between the GAF scores pre- treatment (M = 54.15, SD = 7.22) and post- treatment (M = 65.61, SD = 10.33), shown in Table 2. To investigate sex differences a split-plot ANOVA was conducted with pre- and post- GAF scores from males and females. The main effect of time was significant, $F(1, 91) = 6.36$, $MSE = 50.46$, $p < .001$, as was the effect of sex, $F(1, 91) = 7.66$, $MSE = 100.26$, $p = .007$. The interaction of these two factors was not significant, $F(1, 91) = .06$, $MSE = 50.46$, $p = .808$. Females generally showed lower pre- scores (meaning lower levels of functioning) compared to males, but there was a comparable improvement in GAF in both groups.

Table 2. BSI and GAF measurements pre and post treatment

	N	Pre M (SD)	Post M (SD)	*p*-value
GAF	**92**	**54.15 (7.22)**	**65.61 (10.33)**	**.001****
BSI	**45**	**1.01 (.62)**	**.46 (.45)**	**.001****

Note. M = mean. SD = standard deviation. GAF = Global Assessment of Functioning. BSI = Brief Symptom Inventory.

* significant at a $p < .01$ level. ** significant at a $p < .001$ level.

The same analysis was carried out on the BSI scores. Because the BSI only applies to patients of 18 years and onwards, both begin and end measures of the BSI were available for 45 patients (see Table 2). Again, the main effect of time was significant, $F(1, 43) = 6.36$, $MSE = .14$, $p < .001$, as was the effect of sex, $F(1, 43) = 6.36$, $MSE = .34$, $p = .015$. The interaction of these two factors was not significant, $F(1, 43) = 2.29$, $MSE = .14$, $p = .138$. This means that pre- treatment, females generally scored higher (meaning worse) compared to males on the BSI, but over time, symptoms improved for both groups.

In short, results show a complex patient population with significant improved functioning post treatment.

Discussion

This study reported on the working method of an innovative specialized YMH team located in the Netherlands and on its patient characteristics, thereby supporting systems transformation.

Working method

The working method of the YMH team demonstrated that, by being able to complete treatment within the same team of professionals and working transdiagnostically, continuity of care was met around the age of 18. The YMH team adhered to a client-centred approach by being flexible to adjust treatment to the complexity and changing needs of this patient group.

The above described complexity fits secondary mental health care, and seems an important follow-up to easy access services, like the integrated youth mental healthcare service Headspace in Australia (Hetrick et al., 2017), or @ease in the Netherlands (McGorry & Mei, 2018): indeed 40% of Headspace users are too complex and need referral to specialized services.

Patient characteristics

Our findings support the need for a client-centred approach. Main diagnoses in the current study reflect previous research with anxiety, mood and behavioural disorders as most common diagnoses (Rickwood et al., 2014; Merikangas et al., 2010; Costello et al., 2005; Cooper & Sing, 2000; Tohen et al., 2000).

Our findings are in line with other studies of youth (15 to 25 years) where the percentage of patients with co-morbidities range from 60% (versus 66% in the present study), when comorbidity refers to the presence of more than one psychiatric disorder of mental health-care service users (Pottick et al., 2014), to as much as 98% (as in the present study), when also other psychosocial or environmental problems or needs presented were included (Social Exclusion Unit, Office of the Deputy Prime Minister, 2004). Axis II diagnoses were often deferred. Therefore, our patients might have had more disorders than ascertained at that moment, making it likely that diagnoses remained underreported. This finding stresses the high complexity of mental health in youth and the need to use an array of expertise within a YMH team as well as organisations outside direct mental health care.

The high number of Axis IV factors reported is understandable since this is the age where people usually attend school or study elsewhere. Moreover at this phase of life around puberty, individuals may encounter more relational problems with parents or family. An Australian study (Rickwood et al., 2014) found that a considerable number of patients accessing specialized mental health care, reported relationships (11.4%) or school/work (6%) as main reason for seeking help. The ''Breaking the Cycle'' report (Social Exclusion Unit, Office of the Deputy Prime Minister, 2004) also lists homelessness, problems regarding education or work, crime, and poor housing as typical problems youth face. It seems likely that psychological problems or disorders are linked to psychosocial and environmental problems where effects and interaction in both directions are probable. Therefore, cooperating with, for example, care services that aim to support youth in daily life is of great value as these services can directly target the two most common axis IV factors in our study, namely educational problems and problems with a primary support group, each of which are seen in about two-thirds of the patients here.

Our findings show a relatively high percentage of low intellectual capacity, indicating the importance of awareness and screening of intellectual disability. While patients are usually screened for axis I and II disorders, intelligence is only tested after an indication or possibly stagnation of therapy. From previous research, it is well recognised that people with intellectual disability are more likely to suffer from mental health disorders compared to individuals with normal intellectual abilities and that those individuals with dual diagnoses may benefit from adapted treatment approaches (Hodapp et al., 2006).

Treatment effect

To explore the effectiveness of the YMH team, treatment effects were analysed for the whole group of patients as well as for the two sex groups separately. Our results indicate an overall positive and significant improvement of patient symptoms given their BSI score (rated by the patient) and improved functioning, as indicated by higher GAF scores (rated by the clinician) at the end of treatment compared to the beginning. Although the BSI scores are only available for 18 years onwards, it is encouraging that results of the GAF scores are in line with the results of the BSI scores, as GAF was also administered for those patients younger than 18 years. Thus, both patients and professionals experienced improvement after therapy and patients' BSI scores seem to reach a comparable level to the general population (Beurs, 2006). These are excellent results given the complexity of problems and they support the integrated, client-centred approach of the YMH team.

Analysis of the two sex groups separately, does not seem to call for an immediate need for a sex-specific approach. Our patient group consisted of 40% males versus 60% females, which is a common finding in clinical samples (Rickwood et al., 2014; Vessey & Howard, 1993). Our results indicate that males started out with lower clinical scores, reporting less severe self-reported symptoms, than females. An explanation for the gender difference in clinical scores at the start might be that males, although suffering from possibly strong symptoms, are less likely to disclose mental health problems related to social stigma in line with their stereotypical roles. Females are more willing to disclose distressing information to others (Ward et al., 2007; World Health Organization, 2001) and ask for help. Even though the clinical scores initially differ, males and females show comparable improvement rates according to patients' own ratings and professionals' assessment.

Limitations

Our findings are limited by the lack of a comparison group. Superiority of the YMH team approach could be demonstrated by comparing patients of a specialized YMH team to patients of mental health institutions that do not offer a special service for this group and adhere to standard CAMHS and AMHS procedures. A follow up study measuring long-term effects would be further enlightening. Furthermore, continuity would be necessary not only for treatment but also for diagnostic instruments and outcome measures to ensure quality and effectiveness in youth mental health (Kwan & Rickwood, 2015).

In summary, our description of the working method of the innovative YMH team and the clinical characteristics of its population, support the importance of continuity of care around the critical age of 18 and demonstrates beneficial effects of the described client-centred approach.

Practical recommendations

This paper concludes by offering practical recommendations for YMH psychiatry in practice, based on the study results. Firstly, co-morbidities in patients are common and they and their interaction should be considered including all diagnoses and other areas of concern. This includes special attention for intellectual disability since this has implications for choice of treatment and its effect. Our results suggest that due to co-morbidities, a multidisciplinary and comprehensive approach addressing the multitude and combination of disorders and problems seems more appropriate for youth, than working with separate care paths with specialized teams for different disorders.

Secondly, results suggest that YMH should include particular attention to psychosocial and environmental problems as they are closely linked to each other and call for an integral approach to understand and treat them. This also applies to educational problems, which are extremely frequent in this group and have far reaching consequences for the individual.

It is important that YMH programs with continuous care around the age of 18 receive more attention and become the standard rather than the exception. Clinical disorders in youth do not respect age- or diagnostic boundaries.

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Chapter 3

Across the continuum: Associations between (fluctuations in) momentary self-esteem and psychotic experiences

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Abstract

Objective

Low self-esteem has been suggested as a putative mechanism in the development and maintenance of psychosis. Uncertainty still exists about how unstable self-esteem relates to psychotic experiences. The present study examines the potential (temporal) associations between momentary self-esteem, fluctuations in self-esteem, and psychotic experiences in daily life.

Methods

Experience sampling data were collected from 46 individuals presenting with an at-risk mental state (ARMS), 51 individuals with first-episode psychosis (FEP), and 53 controls, to investigate associations between (fluctuations in) self-esteem and psychotic experiences within and across FEP, ARMS, and controls, using linear mixed models.

Results

In all three groups we found that lower momentary self-esteem was associated with a greater intensity of psychotic experiences (adj. β_{FEP} = -0.15, 95% CI -0.20 to -0.10, p=0.000; adj. β_{ARMS} = -0.20, 95% CI -0.26 to -0.15, p=0.000; adj. $\beta_{controls}$ = -0.12, 95% CI -0.17 to -0.07, p=0.000). Variability in momentary self-esteem was associated with a greater intensity of psychotic experiences only in ARMS (adj. β_{ARMS} = 0.08, 95% CI 0.04 to 0.11, p=0.000) and controls (adj. $\beta_{controls}$ = 0.04, 95% CI 0.01 to 0.08, p=0.023). For instability this association held only in controls (adj. $\beta_{controls}$ = 0.03, 95% CI 0.00 to 0.05, p=0.020). Furthermore, findings may suggest a reciprocal temporal association between self-esteem and psychotic experiences.

Conclusions

Our findings suggest that self-esteem may be an important mechanism targetable by ecological momentary interventions to reduce the intensity of psychotic experiences and potentially prevent illness progression at an early stage.

Introduction

The idea of a continuum has been of substantial interest within the field of psychosis research over the past decades. Data from many studies have suggested that symptoms of psychosis may be distributed along a continuum, and compelling support has been found for temporal and phenomenological continuity of psychotic experiences (Linscott & van Os, 2013; van Os, 2014; van Os & Reininghaus, 2016). Psychotic experiences are present along the continuum (ranging from fleeting and infrequent to continuous and persistent) and do not exclusively occur during a period of clinical psychosis (Kaymaz et al., 2012; Kelleher et al., 2012). Furthermore, psychotic experiences are mostly transient with only 20% of individuals experiencing psychotic experiences, reporting their persistence (Linscott & van Os, 2013). These subthreshold psychotic experiences have been argued to have some predictive value for the development of clinical psychosis (A. R. Yung et al., 2003; A. R. Yung, Phillips, Yuen, & McGorry, 2004) with a transition rate of 7.4% (Linscott & van Os, 2013).

Along the psychosis continuum, individuals at high risk of developing psychotic disorders can be identified by criteria established through early intervention research (Fusar-Poli, Borgwardt, et al., 2013; Miller et al., 2002; A. R. Yung et al., 1996) and are also referred to as individuals presenting with an At-Risk Mental State (ARMS) that may dissolve, persist, or transition into a range of mental disorders (A. R. Yung et al., 2005). The amount of ARMS individuals that develop a psychotic disorder over time is considerable, as a recent review by Fusar-Poli et al. (2020) reported a mean transition rate of 22% at a mean follow-up of 3 years and the highest risk within the first year (the reported median time to psychosis was 8 months) (Fusar-Poli et al., 2020). Studying individuals along the psychosis continuum, including individuals presenting with an ARMS, and individuals with first-episode psychosis (FEP) may, therefore, contribute to a deeper understanding of psychotic experiences at different levels of severity (Zavos et al., 2014).

Research on the mechanisms involved in the development of psychotic experiences across the psychosis continuum is instrumental in aiding our understanding of the etiology of psychosis. Previous work has considered and investigated self-esteem as one such mechanism in the development of psychosis (Garety, Bebbington, Fowler, Freeman, & Kuipers, 2007; Garety, Kuipers, Fowler, Freeman, & Bebbington, 2001; Krabbendam et al., 2002; McIntyre, Wickham, Barr, & Bentall, 2018; Zeigler-Hill, 2011), and it should be considered that self-esteem fluctuates over time (Kernis, 2005). Within the field of psychosis research, the relevance of variability as an emotional processing mechanism has been addressed by Myin-Germeys et al. (2000). Further, Bentall et al. (2001) underscored the need for a model that takes into account the lack of stability in self-esteem (Bentall, Corcoran, Howard, Blackwood, & Kinderman, 2001; Myin-Germeys et al., 2000). The

impact of instability in self-esteem on the development of psychosis is not yet clear. Some evidence suggests an association between unstable self-esteem and paranoia (Thewissen et al., 2007). In their seminal experience sampling work into fluctuations in self-esteem, Thewissen et al. (2008; 2011) found that individuals experiencing high levels of paranoia reported higher instability of self-esteem in daily life than individuals experiencing low levels of paranoia. Furthermore, their results showed higher fluctuations of self-esteem to be associated with increased paranoid experiences and a decrease in self-esteem to be predictive for the onset of a paranoid episode (Thewissen, Bentall, Lecomte, van Os, & Myin-Germeys, 2008; Thewissen et al., 2011).

Our overall aim was to examine the associations between momentary self-esteem, fluctuations in momentary self-esteem, and psychotic experiences in daily life in an experience sampling study of individuals with FEP, individuals with ARMS, and controls. Specifically, we aimed to test the following hypotheses: 1) momentary self-esteem will be lower in FEP than in ARMS, and lower in ARMS than in controls; 2) fluctuations in momentary self-esteem (i.e., variability, instability), will be greater in FEP than in ARMS, and lower in ARMS than in controls; 3) within FEP, ARMS, and controls, lower momentary self-esteem will be associated with an increased intensity of psychotic experiences in daily life; the magnitude of associations of momentary self-esteem with psychotic experiences in daily life will be greater in FEP than in ARMS, and greater in ARMS than in controls; 4) within FEP, ARMS, and controls, greater fluctuations of momentary self-esteem will be associated with an increased intensity of psychotic experiences in daily life; the magnitude of associations of fluctuations in momentary self-esteem with psychotic experiences in daily life will be greater in FEP than in ARMS, and greater in ARMS than in controls; and 5) (fluctuations in) momentary self-esteem will precede psychotic experiences in FEP, ARMS, and controls.

Method

Sample

The sample consists of ARMS individuals, FEP individuals, and controls, identified in the Childhood Adversity and Psychosis study and "The European Network of National Networks studying Gene-Environment Interactions in Schizophrenia" (European Network of National Networks studying Gene-Environment Interactions in et al., 2014; Reininghaus, Gayer-Anderson, et al., 2016; Reininghaus, Kempton, et al., 2016). Further details on this sample, previous analyses and findings have been reported in previous papers (Hermans et al., 2020; Klippel et al., 2017; Reininghaus, Gayer-Anderson, et al., 2016; Reininghaus, Kempton, et al., 2016; Reininghaus et al., 2019). Table 1 provides an overview of the

method of recruitment, and inclusion- and exclusion criteria for FEP individuals, ARMS individuals and controls.

Table 1. Method of recruitment, inclusion, and exclusion criteria for participants

Sample	
FEP	
Recruitment of FEP individuals was established at mental health services (MHS) in south-east London. Participants residing in hospital at time of consent completed ESM assessments after they had been discharged.	
Inclusion criteria:	· between 18 and 64 years of age · residence within defined catchment areas · presence of a FEP (ICD-10 F20–F29, F30–F33) (WHO, 1992) · proficiency in the English language
Exclusion criteria:	· transitory psychotic symptoms caused by acute intoxication · psychotic symptoms that have been instigated by an organic cause · IQ lower than 60, measured with an adapted version of the WAIS (European Network of National Networks studying Gene-Environment Interactions in et al., 2014; Ryan et al., 1999)
ARMS	
Recruitment of ARMS individuals was established at Outreach and Support in South London (OASIS), a clinical service for people at high risk of psychosis provided by the South London and Maudsley NHS Foundation Trust (Fusar-Poli, Byrne, Badger, Valmaggia, & McGuire, 2013), the West London Mental Health NHS Trust (WLMHT), and a community survey of General Practitioner (GP) practices.	
Inclusion criteria:	· between 18 and 35 years of age · meeting the criteria of an ARMS according to the CAARMS (Oliver et al., 2018; A. R. Yung et al., 2005) or the SPI-A which measures subtle subclinical self-experienced disturbances in drive, stress tolerance, affect, thinking, speech, perception and motor action (Klosterkotter, Schultze-Lutter, Bechdolf, & Ruhrmann, 2011; Frauke Schultze-Lutter, Klosterkötter, Picker, Steinmeyer, & Ruhrmann, 2007; F. Schultze-Lutter, Ruhrmann, Berning, Maier, & Klosterkotter, 2010) · proficiency in the English language
Exclusion criteria:	· a prior psychotic episode for more than one week as determined by the CAARMS and SCID (First, Spitzer, Gibbon, & Williams, 2002) · previous treatments with antipsychotic medication for a psychotic episode · IQ lower than 60, measured with an adapted version of the WAIS (European Network of National Networks studying Gene-Environment Interactions in et al., 2014; Ryan, Weilage, & Spaulding, 1999)
Controls	
Controls were recruited from GP practices, using GP lists (registered patients falling under the responsibility of the practice to provide them with primary medical services), and the national postal address file was used as a sampling frame.	

Inclusion criteria:	·	between 18 and 64 years of age
	·	residing within the same defined areas as FEP individuals
	·	proficiency in the English language
Exclusion criteria:	·	transitory psychotic symptoms caused by acute intoxication
	·	psychotic symptoms that have been instigated by an organic cause
	·	IQ lower than 60, measured with an adapted version of the WAIS (European Network of National Networks studying Gene-Environment Interactions in et al., 2014; Ryan et al., 1999)
	·	personal or family history of a psychotic disorder (Maxwell, 1992)
	·	psychotic symptoms being present, measured with the Psychosis Screening Questionnaire (PSQ) (Bebbington & Nayani, 1995)
	·	presenting an ARMS based on the CAARMS or SPI-A

Note: FEP, First-Episode Psychosis; ARMS, At-Risk Mental State for psychosis; CAARMS, Comprehensive Assessment of At-Risk Mental States; SPI-A, Schizophrenia Proneness Instrument–Adult version; SCID, Structured Clinical Interview for DSM Disorders; WAIS, Wechsler Adult Intelligence Scale

The timeframe in which all participants entered the study and data were collected was June 2012 to August 2014. The National Research Ethics Service Committee London Central gave full ethical approval for all aspects of the study.

Data collection

Data on momentary self-esteem and psychotic experiences were collected using ESM. More precisely, stratified random sampling was applied within a time-based design (meaning ESM assessments were randomly programmed within set blocks of time) (Myin-Germeys et al., 2018; Palmier-Claus et al., 2011; Shiffman, Stone, & Hufford, 2008; Thewissen et al., 2011). Each participant received a dedicated digital device, namely the PsyMate®, an application widely used in previous research to collect ESM data (Myin-Germeys, Birchwood, & Kwapil, 2011; Verhagen et al., 2017).

Measures

Data on momentary self-esteem, fluctuations in momentary self-esteem, and psychotic experiences were collected using the ESM to be able to assess momentary self-esteem repeatedly over time in daily life and additionally measure and analyse temporal changes in momentary self-esteem as well as temporal associations between momentary self-esteem and psychotic experiences. Table 2 provides more detail on the ESM measures, as well as the ESM procedure. Figure 1 aims to further clarify the variables used in our time-lagged analyses of momentary self-esteem to measure fluctuations in momentary self-esteem.

Table 2. ESM procedure[a] and measures of (fluctuations in) momentary self-esteem, and psychotic experiences.

Domain	ESM measure
Momentary self-esteem	Self-esteem was measured through two ESM items (as part of an ESM questionnaire prompted by a beep): 'I like myself' and 'I am disappointed in myself', both rated on a 7-point Likert scale (ranging from 1 ('not at all') to 7 ('very much')). Momentary self-esteem was defined as the mean score of the two self-esteem measures (scoring on the item 'I am disappointed in myself' was reversed). Previous ESM studies using similar items of self-esteem demonstrated good reliability and validity (Crowe, Daly, Delaney, Carroll, & Malone, 2019; Pavlickova, Turnbull, Myin-Germeys, & Bentall, 2015; Thewissen et al., 2008; Thewissen et al., 2011). As a measure of concurrent validity, we calculated correlations of self-esteem and related constructs such as negative affect (Hards, Ellis, Fisk, & Reynolds, 2020; Orth, Robins, Widaman, & Conger, 2014) and stress (Kirschbaum et al., 1995; Kogler et al., 2017; Taylor et al., 2008). The results of the correlational analysis are shown in Supplementary Table 1, presenting findings of negative correlations between self-esteem and negative affect, for all three groups, as well as negative correlations between self-esteem and different types of perceived stress, for all three groups. These findings suggest good concurrent validity.
Variability of momentary self-esteem[b]	Variability of momentary self-esteem was measured as the squared difference between the beep-level score of self-esteem at each observation and individual mean self-esteem over observations and days within persons (Nelis & Bukowski, 2019; Okada, 2010).
Instability of momentary self-esteem[b]	Instability of momentary self-esteem was measured as the squared difference between the beep-level scores of self-esteem between subsequent sequential observations over days within persons (Thewissen et al., 2008; Thewissen et al., 2007) (Myin-Germeys et al., 2000; Oorschot et al., 2013), whereby we did not include the lagged difference between the last response of one day and the first response on the next day, thus measured per day and not overnight, and we permitted for one subsequent missing response).
Psychotic experiences	Psychotic experiences were measured through eight ESM items: 'I feel paranoid', 'I feel unreal', 'I hear things that aren't really there', 'I see things that aren't really there', 'I can't get these thoughts out of my mind', 'My thoughts are influenced by others', 'It's hard to express my thoughts in words', and 'I feel like I am losing control', also all rated on a 7-point Likert scale (ranging from 1 ('not at all') to 7 ('very much')). Previous ESM research on psychotic experiences along the psychosis continuum has demonstrated the feasibility, reliability, and validity of this 8-item ESM psychosis measure (Myin-Germeys et al., 2011; Myin-Germeys et al., 2009; Myin-Germeys, van Os, Schwartz, Stone, & Delespaul, 2001; Palmier-Claus, Dunn, & Lewis, 2012; Palmier-Claus et al., 2011; So, Peters, Swendsen, Garety, & Kapur, 2013; van der Steen et al., 2017). A study by Myin-Germeys et al. (2005) showed these 8 items are moderately related to the same construct of psychosis, measured with the interviewer-rated PANSS, which suggests good convergent validity. Also, a Cronbach's alpha of 0.80 was reported in this study. For the present study, a Cronbach's alpha of 0.74 was calculated using person-centered means.

[a] **ESM procedure:** Initially, participants were trained in the use of the PsyMate® during a briefing session, in which detailed technical instructions were provided and a practice questionnaire was filled in to practise the usage of the PsyMate®. In the briefing session, participants were also instructed on the ESM assessment. They were asked to stop their activity to respond to the items each time a "beep" was heard during the assessment period. Answering the items was part of a more comprehensive diary questionnaire assessing thoughts, feelings, activities, behaviours, and neighbourhood surroundings in daily life. Following many ESM studies in mental health research, the assessment period consisted of six consecutive days to obtain and approximate a representative characterization of experience and behaviour in a normal week, in which the PsyMate® emitted ten "beep" signals per day at random moments within set blocks of time, thereby allowing the assessment of highly variable constructs whilst keeping assessment burden at a minimum (Myin-Germeys et al., 2018) After the emission of the 'beep' signal, the ESM questionnaire remained available for participants for 10 minutes. The assessment period started at any day of the week by choice of the participant (to optimize compliance and account for sufficient spreading of week and weekend days in the sample). To maximize their input, participants were contacted at least once during the assessment period to gain insight in their adherence to instructions, address any potential distress associated with the method, and if needed help could be offered to overcome barriers in completing the questionnaire. In a debriefing session at the end of the assessment period, participants' reactivity to, and compliance with, the method was examined. Inclusion in analysis followed if a participant provided valid responses to at least one-third of the emitted beeps (Bentall et al., 2008; Bentall et al., 2009; Delespaul, deVries, & van Os, 2002).

[b] See figure 1 for further clarification of fluctuations of momentary self-esteem.

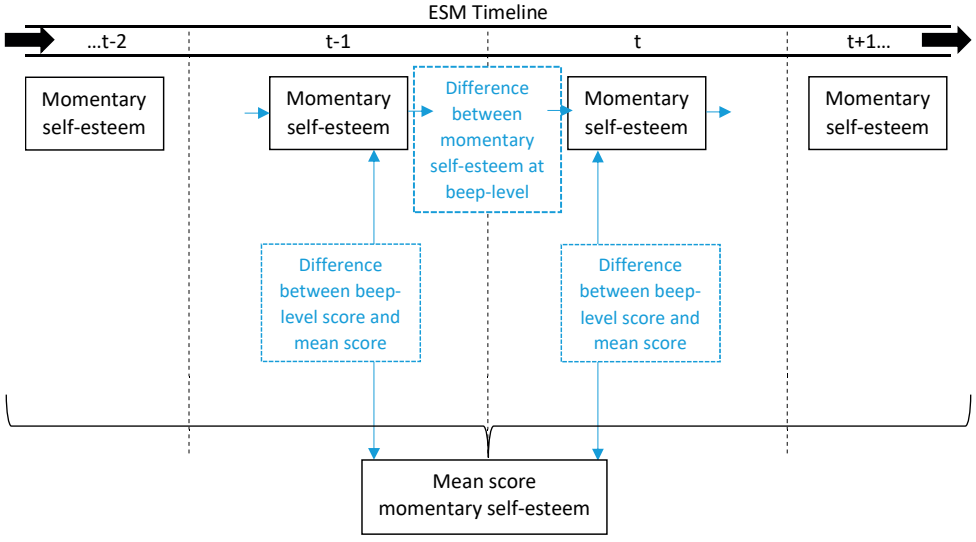

Figure 1. Variables used in our time-lagged analyses of momentary self-esteem to measure fluctuations in momentary self-esteem. ESM = experience sampling method

Statistical analysis

To examine basic sample characteristics and assembled ESM scores (i.e., self-esteem mean scores for each participant over the 6-day period) in ARMS individuals, FEP individuals, and controls, χ^2-tests and linear regression were used as appropriate. Characteristic of ESM data is the fact that multiple observations (level-1) are nested within participants (level-2). Consequently, within-subject clustering of multiple observations was controlled for by using linear mixed models (the 'mixed' command in Stata 13 (StataCorp, 2013)), and a restricted maximum likelihood (REML) approach was used for estimating these models. We used this estimator for managing group differences in the distribution of psychotic experiences.

First, we tested for group differences by fitting separate models with each type of self-esteem measure (momentary self-esteem, variability in momentary self-esteem, and instability in momentary self-esteem) as the outcome variable. The models were adjusted for potential confounders (i.e., age, gender, ethnicity, employment status, and level of education). We used the 'lincom' command to compute linear combinations of coefficients to test whether (fluctuations in) momentary self-esteem differed between ARMS and FEP individuals. Second, models with momentary self-esteem measures as independent variables (momentary self-esteem, variability in momentary self-esteem, and instability in momentary self-esteem) and psychotic experiences in daily life as the outcome variable were fitted, while controlling for potential confounders and including variables associated with missing values in the model. Furthermore, two-way interaction terms for (fluctuations in) momentary self-esteem × group were added to the adjusted main effects model and χ^2-tests were used to evaluate improvement in model fit as well as the 'lincom' command to compute linear combinations of coefficients. This was done to test the hypotheses that associations between (fluctuations in) momentary self-esteem and psychotic experiences were modified by group. Third, to investigate the temporal order of (fluctuations in) self-esteem, and psychotic experiences, we further conducted time-lagged analyses by fitting mixed models. Within-subject lagged variables were generated for (fluctuations in) self-esteem, and psychotic experiences (at t_{n-1} and t_n), and Wald tests were used to evaluate statistical significance of interaction terms. Only if Wald tests were statistically significant, the 'lincom' command was used to compute linear combinations of coefficients for interpreting interaction effects.

To account for multiple comparisons the Simes' correction was applied in line with previous ESM studies (Janssens et al., 2012; van Winkel et al., 2008). This method consists of testing the most significant p-value against $\alpha = 0.05$ divided by the total number of tests (n), consequently the second most significant p-value is tested against $\alpha = 0.05/n-1$, the third most significant p-value against $\alpha = 0.05/n-2$, and so on.

Results

Basic sample characteristics

A total of 165 participants (51 ARMS, 59 FEP, and 55 controls) were assessed with the ESM. Of these, 150 participants (51 FEP, 46 ARMS, and 53 controls) completed ESM assessment with ≥20 valid responses and, hence, a high percentage of data of those initially assessed were analyzed (i.e., 90.9% of 165; Table 3). The percentage of delivering ≥20 valid responses varied from 86,4% in FEP individuals to 96,4% in controls, as is shown in Table 3, alongside other descriptive characteristics.

Table 3. Basic sample characteristics[a]

	FEP (n=51)	ARMS (n=46)	Controls (n=53)	Test statistic	p
Age (years)[b], mean (S.D.)	28.3 (8.6)	23.6 (4.7)	35.0 (12.6)	F=18.6, df=2	<0.001
Gender[b], n (%)					
Men	28 (54.9)	21 (45.7)	25 (47.2)	χ^2=1.0, df=2	0.612
Women	23 (45.1)	25 (54.4)	28 (52.8)		
Ethnicity[b], n (%)					
White British	14 (27.5)	17 (37.0)	25 (47.2)		
Black African	17 (33.3)	7 (15.2)	8 (15.1)		
Black Caribbean	11 (21.6)	7 (15.2)	6 (11.3)	χ^2=14.0, df=10	0.174
Asian	1 (2.0)	1 (2.2)	3 (5.7)		
White Other	4 (7.8)	5 (10.9)	5 (9.4)		
Other	4 (7.8)	9 (19.6)	6 (11.3)		
Place of birth[b], n (%)					
UK-born	32 (62.7)	34 (73.9)	33 (62.3)	χ^2=1.9, df=2	0.396
Non-UK-born	19 (37.3)	12 (26.1)	20 (37.7)		
Level of education[b], n (%)					
School	17 (33.3)	13 (28.9)	8 (15.1)		
Further	25 (49.0)	24 (53.3)	15 (28.3)	χ^2=24.3, df=4	<0.001
Higher	9 (17.7)	8 (17.8)	30 (56.6)		
Employment status[b], n (%)					
Unemployed	30 (58.8)	15 (32.6)	5 (9.4)	χ^2=28.5, df=2	<0.001
Other	21 (41.2)	31 (67.4)	48 (90.6)		

	FEP (n=51)	ARMS (n=46)	Controls (n=53)	Test statistic	p
OPCRIT Psychotic disorder diagnosis[c], n (%)					
Schizophrenia	15 (31.3)	–	–		
Delusional disorder	3 (6.3)	–	–		
Schizoaffective disorder	3 (6.3)	–	–	–	–
Manic psychosis	7 (14.6)	–	–		
Depressive psychosis	7 (14.6)	–	–		
Psychotic disorder NOS	13 (27.1)	–	–		
SCID Comorbid affective disorder diagnosis, n (%)					
Mood disorder	–	5 (10.9)	–		
Anxiety disorder	–	15 (32.6)	–	–	–
Mood and anxiety disorder	–	3 (6.5)	–		
Psychotropic medication[d], n (%)					
Antipsychotic[e]	40 (81.6)	5 (11.9)	0 (0.0)		
Atypical	36 (76.6)	5 (11.9)	0 (0.0)		
Typical	1 (2.1)	0 (0.0)	0 (0.0)	–	–
Atypical and typical	1 (2.1)	0 (0.0)	0 (0.0)		
Antidepressant	11 (22.9)	17 (40.5)	0 (0.0)		
Other	12 (25.0)	4 (9.5)	9 (17.0)		
None	4 (8.2)	22 (52.4)	44 (83.0)		
Aggregate ESM scores, mean (SD)					
Momentary self-esteem	4.79 (1.62)	4.79 (1.56)	5.58 (1.17)	–	–
Psychotic experiences	2.55 (1.43)	2.40 (1.41)	1.47 (0.69)	–	–

Note: FEP, First-Episode Psychosis; ARMS, At-Risk Mental State for psychosis; S.D., standard deviation; df, degrees of freedom; OPCRIT, Operational Criteria system; SCID, Structured Clinical Interview for DSM Disorders; Δp, difference in proportion.

[a] Participants included (≥ 20 valid responses) vs. excluded (< 20 valid responses) by group:

	Overall	FEP	ARMS	Controls	Test statistic	p
	n (%)	n (%)	n (%)	n (%)		
Included (≥ 20 valid responses)	150 (90.9)	51 (86.4)	46 (90.2)	53 (96.4)	χ^2=3.4, df=2	0.179
Excluded (< 20 valid responses)	15 (9.1)	8 (13.6)	5 (9.8)	2 (3.6)		

[b] Differences across groups:

	FEP vs. controls		*ARMS vs. controls*		*FEP vs. ARMS*	
	B (95% CI)	p	B (95% CI)	p	B (95% CI)	p
Age (years)	-6.7 (-10.3 – -3.1)	<0.001	-11.4 (-15.1 – -7.6)	<0.001	4.7 (0.9 – 8.4)	0.015
	Δp (95% CI)	p	Δp (95% CI)	p	Δp (95% CI)	p
Gender						
Men	7.7 (-11.4 – 26.9)	0.430	-1.5 (-21.2 – -18.2)	0.880	9.2 (10.6 – -29.1)	0.363
Ethnicity						
White British	-19.7 (-37.9 – -1.5)	0.038	-10.2 (-29.6 – 9.2)	0.305	-9.5 (-28.1 – 9.1)	0.316
Place of birth						
UK-born	0.5 (-19.1 – 18.1)	0.960	11.6 (-6.6 – 29.9)	0.216	-11.2 (-29.5 – 7.2)	0.239
Level of education						
School	18.2 (2.1 – 34.4)	0.030	13.8 (-2.6 – 30.2)	0.097	4.4 (-23.0 – 14.1)	0.639
Further	20.7 (0.2 – 39.0)	0.030	25.0 (0.06 – 44.0)	0.012	-4.3 (-24.3 – 15.7)	0.673
Higher	-39.0 (-55.9 – -22.0)	<0.001	-38.8 (-56.2 – -21.4)	<0.001	-0.1 (-15.2 – 15.4)	0.987
Employment status						
Unemployed	49.4 (33.8 – 65.0)	<0.001	23.2 (7.5 – 38.8)	0.004	26.2 (7.1 – 45.3)	0.010

[c] Missing values: 3
[d] Missing values: 6
[e] Antipsychotic medication in ARMS individuals was *not* for a psychotic episode (see exclusion criteria)

(Fluctuations in) momentary self-esteem by group

Table 3 also shows the aggregate ESM mean scores of momentary self-esteem. Compared with controls, momentary self-esteem was lower in ARMS (adj. $\beta_{ARMS\ vs.controls}$ = -0.90, 95% CI -1.43 to -0.37, p=0.001) and FEP (adj. $\beta_{FEP\ vs.controls}$ = -0.94, 95% CI -1.44 to -0.43, p<0.000). There was no evidence of differences in momentary self-esteem between ARMS and FEP (adj. $\beta_{ARMS\ vs\ FEP}$ = -0.04, 95% CI -0.49 to 0.42, p=0.871).

Additionally, there was no evidence of differences in fluctuations in momentary self-esteem between groups (Table 4). After applying the Simes' correction we found no significant group differences.

Table 4. Fluctuations in momentary self-esteem by group[a]

	ARMS	FEP	controls	ARMS vs. controls		FEP vs. controls		FEP vs. ARMS	
	Mean (SD)	Mean (SD)	Mean (SD)	Adj. B (95% CI)	*P*	Adj. B (95% CI)	*P*	Adj. B (95% CI)	*P*
Variability	1.15 (1.95)	0.93 (1.75)	0.57 (1.22)	0.37 (0.05 – 0.67)	0.025[b]	0.29 (-.02 – 0.60)	0.069[b]	-0.08 (-.36 – 0.20)	0.573[b]
Instability	1.77 (3.40)	1.52 (3.27)	0.91 (1.98)	0.63 (0.11 – 1.16)	0.018[b]	0.68 (0.17 – 1.19)	0.009[b]	0.05 (-.42 – 0.51)	0.573[b]

Note: SD, standard deviation; CI, confidence interval; vs., versus

[a] Adjusted for age, sex, ethnicity, educational level and employment status

[b] Not statistically significant after Simes' correction

Momentary self-esteem and psychotic experiences in daily life

Table 5 shows that lower momentary self-esteem was associated with an increased intensity of psychotic experiences in daily life in all three groups. These results need to be interpreted with caution since after Simes' correction on the Wald test, the interaction effects are not significant. However, in ESM research, smaller effect sizes may be considered clinically relevant, given that they occur in the course of daily life and therefore may yield a substantial cumulative effect on individuals over time (Klippel et al., 2017; Lardinois, Lataster, Mengelers, Van Os, & Myin-Germeys, 2011). Thus, at trend-level we found that the magnitude of associations of momentary self-esteem with psychotic experiences in daily life differs across groups (χ^2=5.39, p=0.067). Specifically, we found a difference in magnitude of associations across ARMS and controls (adj. $\beta_{ARMS\ vs.controls}$=0.09, 95% CI 0.01 to 0.16, p=0.021), where associations were greater in ARMS than in controls. However there was no evidence of a difference across FEP and controls (adj. $\beta_{FEP\ vs.controls}$=0.04, 95% CI -0.04 to 0.11, p=0.330) nor across FEP and ARMS (adj. $\beta_{FEP\ vs.ARMS}$=0.05, 95% CI -0.02 to 0.12, p=0.173).

Table 5. Associations of (fluctuations in) momentary self-esteem with psychotic experiences by group[a]

	Outcome: Psychotic experiences							
	Controls		**ARMS**		**FEP**		**Wald test for interaction[b]**	
	Adj. B (95% CI)	*P*	Adj. B (95% CI)	*P*	Adj. B (95% CI)	*P*	χ^2 (df)	*P*
Momentary self-esteem	-0.12 (-0.17 - -0.07)	0.000	-0.20 (-0.26 - -0.15)	0.000	-0.15 (-0.20 - -0.10)	0.000	5.39 (2)	0.0674
Variability	0.04 (0.01 – 0.08)	0.023	0.08 (0.04 – 0.11)	0.000	0.03 (-0.004 – 0.07)	0.083	3.45 (2)	0.1779
Instability	0.03 (0.004 – 0.05)	0.020	0.01 (-0.01 – 0.03)	0.205	0.00 (-0.02 – 0.02)	0.721	2.19 (2)	0.3352

Note: ARMS, At-Risk Mental State for psychosis; FEP, First-Episode Psychosis; CI, confidence interval; vs., versus

[a] Adjusted for age, sex, ethnicity, educational level and employment status

[b] Wald test for (fluctuations in) momentary self-esteem × group interaction; difference in coefficients across groups:

	ARMS vs. controls		*FEP vs. controls*		*FEP vs. ARMS*	
	Adj. B (95% CI)	*P*	Adj. B (95% CI)	*P*	Adj. B (95% CI)	*P*
Momentary self-esteem	-0.09 (-0.16 - -0.01)	0.021	-0.04 (-0.11 – 0.04)	0.330	0.05 (-0.02 – 0.12)	0.173

Fluctuations in momentary self-esteem and psychotic experiences in daily life

Table 5 also shows findings on fluctuations in momentary self-esteem in relation to psychotic experiences in ARMS, FEP, and controls. For ARMS and controls, we found that variability in momentary self-esteem was associated with a slight increase in psychotic experiences (adj. β_{ARMS}=0.08, 95% CI 0.04 to 0.11, p=0.000; adj. $\beta_{controls}$=0.04, 95% CI 0.01 to 0.08, p=0.023). Regarding the association between instability in momentary self-esteem and psychotic experiences, only in controls did we find instability in self-esteem to be associated with a slight increase in psychotic experiences (adj. β=0.03, 95% CI 0.00 to 0.05, p=0.020). No evidence was found for an association between instability of momentary self-esteem and psychotic experiences for ARMS or FEP. We did not find any evidence that, in cross-sectional (non-lagged) analyses, the magnitude of associations between fluctuations in momentary self-esteem and psychotic experiences in daily life differed across groups (for variability χ^2=3.45, p=0.178, and instability χ^2=2.19, p=0.335).

Temporal order of (fluctuations in) momentary self-esteem and psychotic experiences

Table 6 shows findings on temporal associations between (fluctuations in) momentary self-esteem and psychotic experiences. We found that self-esteem at t_{n-1} in FEP and controls, and variability in self-esteem at t_{n-1} in FEP were temporally associated with psychotic experiences at the subsequent time point (t_n). We found interaction effects for momentary self-esteem at t_{n-1} × group, as well as variability in momentary self-esteem at $t_{n-}1$ × group on psychotic experiences at t_n as the outcome variable, by which the magnitude of associations of momentary self-esteem at t_{n-1} with psychotic experiences at t_n as well as variability in self-esteem at t_{n-1} with psychotic experiences at t_n differed significantly between FEP vs. ARMS and FEP vs. controls. No significant interaction effects were found for instability in momentary self-esteem at t_{n-1} × group on psychotic experiences at t_n as the outcome variable.

Furthermore, table 6 shows findings on temporal associations of psychotic experiences at t_{n-1} and fluctuations in momentary self-esteem at t_{n-1}, with momentary self-esteem at t_n. We found that psychotic experiences at t_{n-1} in all three groups, as well as variability in self-esteem at t_{n-1} for FEP and controls, were temporally associated with momentary self-esteem at t_n. No significant interaction effects were found for (fluctuations in) momentary self-esteem at t_{n-1} × group and psychotic experiences at t_{n-1} × group on momentary self-esteem at t_n as the outcome variable.

Psychotic experiences at t_{n-1} in FEP, momentary self-esteem at t_{n-1} in all three groups, and variability in self-esteem at t_{n-1} in all three groups, were temporally associated with instability in self-esteem at t_n. An interaction effect was only found for variability in self-esteem at t_{n-1} × group on instability in self-esteem at t_n, by which the magnitude of associations differed significantly between FEP vs. ARMS and FEP vs. controls.

Psychotic experiences at t_{n-1} in FEP and instability in self-esteem at t_{n-1} in FEP were temporally associated with variability in self-esteem at t_n. Only for instability in self-esteem at t_{n-1} × group on variability in self-esteem at t_n an interaction effect was found, with a greater magnitude of association in FEP vs. ARMS and FEP vs. controls.

Table 6. Effect of (instability and variability of) self-esteem and psychotic experiences at t_{n-1} on outcome at t_n by group[a]

Psychological mechanism	FEP		ARMS		Controls		Wald test for interaction	
	adj. B (95% CI)	p	adj. B (95% CI)	p	adj. B (95% CI)	p	χ^2 (df)	p
Outcome: Psychotic experiences at t_n[b]								
Momentary self-esteem t_{n-1}	-0.09 (-0.13 - -0.06)	0.000	-0.03 (-0.06 – 0.004)	0.101	-0.04 (-0.07 - -0.01)	0.039	10.46 (2)	0.0054[c]
Fluctuations in self-esteem								
Instability t_{n-1}	0.01 (-0.004 – 0.02)	0.182	-0.003 (-0.01 – 0.01)	0.507	-0.003 (-0.02 – 0.01)	0.702	2.36 (2)	0.3079
Variability t_{n-1}	0.06 (0.04 – 0.08)	0.000	-0.01 (-0.03 – 0.01)	0.369	0.01 (-0.02 – 0.03)	0.603	27.15 (2)	0.0000[c]
Outcome: Self-esteem at t_n[d]								
Psychotic experiences t_{n-1}	-0.12 (-0.20 - -0.05)	0.001	-0.12 (-0.19 - -0.06)	0.000	-0.18 (-0.28 - -0.07)	0.001	0.86 (2)	0.6501
Fluctuations in self-esteem								
Instability t_{n-1}	-0.001 (-0.02 – 0.02)	0.913	0.01 (-0.01 – 0.03)	0.353	0.01 (-0.02 – 0.03)	0.692	0.50 (2)	0.7792
Variability t_{n-1}	0.04 (0.01 – 0.07)	0.009	0.02 (-0.01 – 0.05)	0.227	0.04 (0.001 – 0.08)	0.043	1.53 (2)	0.4651
Outcome: Instability in self-esteem at t_n[e]								
Psychotic experiences t_{n-1}	0.20 (0.05 – 0.36)	0.011	0.09 (-0.06 0 0.25)	0.227	0.12 (0.14 – 0.38)	0.350	1.04 (2)	0.5956
Momentary self-esteem t_{n-1}	-0.38 (-0.51 - -0.26)	0.000	-0.24 (-0.37 - -0.12)	0.000	-0.33 (-0.48 - -0.18)	0.000	2.41 (2)	0.3002

	FEP		ARMS		Controls		Wald test for interaction	
	adj. B (95% CI)	p	adj. B (95% CI)	p	adj. B (95% CI)	p	χ^2 (df)	p
Fluctuations in self-esteem								
Variability t_{n-1}	0.92 (0.83 – 1.00)	0.000	0.69 (0.61 – 0.78)	0.000	0.66 (0.54 – 0.77)	0.000	20.3 (2)	0.0000[f]
Outcome: Variability in self-esteem at t_n[g]								
Psychotic experiences t_{n-1}	0.17 (0.07 – 0.26)	0.001	0.02 (-0.08 – 0.11)	0.731	0.04 (-0.12 – 0.19)	0.626	5.15 (2)	0.0762
Momentary self- esteem t_{n-1}	-0.04 (-0.12 – 0.04)	0.296	-0.01 (-0.09 – 0.06)	0.691	-0.04 (-0.12 – 0.05)	0.418	0.27 (2)	0.8740
Fluctuations in self-esteem								
Instability t_{n-1}	0.08 (0.05 – 0.11)	0.000	-0.02 (-0.05 – 0.01)	0.258	-0.03 (-0.07 – 0.01)	0.196	24.3 (2)	0.0000[h]

Note: CI, confidence interval

[a] Adjusted for age, sex, ethnicity, educational level and employment status

[b] Adjusted for Psychotic experiences t_{n-1}

[c] Wald test for (fluctuations in) momentary self-esteem × group interaction; difference in coefficients across groups:

	ARMS vs. Controls		FEP vs. controls		FEP vs. ARMS	
	adj. B (95% CI)	p	adj. B (95% CI)	p	adj. B (95% CI)	p
Momentary self-esteem t_{n-1}	0.01 (-0.03 – 0.06)	0.614	-0.06 (-0.11 - -0.01)	0.018	-0.07 (-0.11 - -0.03)	0.002
Self-esteem Variability t_{n-1}	-0.01 (-0.05 – 0.02)	0.340	0.05 (0.02 – 0.08)	0.001	0.07 (0.04 0.09)	0.000

[d] Adjusted for Momentary self-esteem at t_{n-1}

[e] Adjusted for Instability in self-esteem at t_{n-1}

[f] Wald test for (fluctuations in) momentary self-esteem × group interaction; difference in coefficients across groups:

	Arms vs. Controls		FEP vs. Controls		FEP vs. Arms	
	adj. B (95% CI)	p	adj. B (95% CI)	p	adj. B (95% CI)	p
Self-esteem Variability t_{n-1}	0.04 (-0.09 – 0.17)	0.568	0.26 (0.13 – 0.40)	0.000	0.22 (0.11 – 0.33)	0.000

[g] Adjusted for Variability in self-esteem at t_{n-1}

[h] Wald test for (fluctuations in) momentary self-esteem × group interaction; difference in coefficients across groups:

	Arms vs. Controls		FEP vs. Controls		FEP vs. Arms	
	adj. B (95% CI)	p	adj. B (95% CI)	p	adj. B (95% CI)	p
Self-esteem Instability t_{n-1}	0.01 (-0.04 – 0.06)	0.662	0.11 (0.06 – 0.16)	0.000	0.10 (0.05 – 0.14)	0.000

Discussion

Principal findings

To the best of our knowledge, this study was the first to investigate the role of fluctuations in self-esteem on psychotic experiences in a sample of FEP individuals, ARMS individuals, and controls, using ESM. The first hypothesis was supported by our findings, suggesting that FEP individuals and ARMS individuals experience lower momentary self-esteem than controls. However, there was no evidence of a difference in momentary self-esteem between ARMS and FEP. We did not find any support for our second hypothesis that fluctuations in momentary self-esteem (i.e., variability, instability), will be greater in FEP than in ARMS, and lower in ARMS than in controls.

Some support was found, at trend level, for our hypothesis that within FEP, ARMS, and controls, lower momentary self-esteem was associated with an increased intensity of psychotic experiences in daily life. In all three groups, we found that low self-esteem was associated with a greater intensity of psychotic experiences. However, the magnitude of these associations differed only to a limited extent across ARMS and controls. The association between momentary self-esteem and psychotic experiences was strongest for ARMS individuals, suggesting that momentary low self-esteem is of greater influence on experiencing psychotic symptoms or vice versa. The finding that the magnitude of the association between low self-esteem and psychotic experiences was not even greater in FEP individuals might indicate that this association does not seem to fit with the model of a psychosis continuum. There was further evidence that greater variability in momentary self-esteem was positively associated with more intense psychotic experiences in ARMS and controls, but did not differ across the three groups. Instability in momentary self-esteem was positively associated with psychotic experiences only in controls. This may suggest that instability of self-esteem either is of greater influence in controls on experiencing low-level and maybe more transient psychotic symptoms, or that experiencing the latter may be of greater influence on lowering self-esteem in controls. Future research investigating whether the level of self-esteem moderates an association between (fluctuations in) momentary self-esteem and psychotic experiences is warranted to interpret our results regarding a stronger association between momentary self-esteem and psychotic experiences in ARMS in comparison to controls versus the association between instability in self-esteem and psychotic experiences only present in controls. Thus, our fourth hypothesis was only partly supported, no significant interaction effects were found for fluctuations in momentary self-esteem × group.

Regarding the fifth hypothesis on temporal associations, the main finding was that momentary self-esteem (in FEP and controls) and variability in self-esteem (in FEP) were

temporally associated with psychotic experiences at a later time-point, whereby the magnitude of associations of momentary self-esteem at t_{n-1} with psychotic experiences at t_n as well as variability in self-esteem at t_{n-1} with psychotic experiences at t_n was greater for FEP vs. ARMS and FEP vs. controls. Furthermore, psychotic experiences (in all three groups) and variability in self-esteem (in FEP and controls) were temporally associated with momentary self-esteem at a later time-point, however, no significant interaction effects were found for (fluctuations in) momentary self-esteem at t_{n-1} × group and psychotic experiences at t_{n-1} × group on momentary self-esteem at t_n as the outcome variable. Psychotic experiences at t_{n-1} preceded both instability in self-esteem at t_n and variability in self-esteem at t_n in FEP individuals. Thus, the findings may suggest a reciprocal temporal association between self-esteem and psychotic experiences. Further, the finding that mainly FEP individuals show significant temporal associations and greater magnitudes of associations may tentatively suggest a threshold effect in that lower levels of momentary self-esteem increase the intensity of psychotic experiences more markedly, and vice versa, only when a psychotic disorder has become manifest and to a lesser extent when attenuated psychotic experiences are present (i.e., as is the case in ARMS). An alternative or additional explanation of this finding may be that when symptoms are overtly manifested this may lead to stigmatization by others, negatively impact self-esteem and fuel the association between psychotic experiences and self-esteem (Rusch, Angermeyer, & Corrigan, 2005).

The results of the present study are in accord with recent research indicating that low self-esteem is associated with psychotic experiences (Dolphin, Dooley, & Fitzgerald, 2015; Healy et al., 2019; Vass et al., 2015), and, compared with controls, lower self-esteem is reported by ARMS individuals and FEP individuals (Pruessner, Iyer, Faridi, Joober, & Malla, 2011). The suggested reciprocal temporal association between (fluctuations in) self-esteem and psychotic experiences, adds to the existing literature on a putative temporal pathway from negative beliefs to paranoid symptoms, as well as state paranoia having a negative effect on self-esteem (Bentall et al., 2001; Fowler et al., 2012).

Methodological considerations

In line with many ESM studies in psychiatry, we have held a threshold of 33% completion rate of prompts, adhering to the rule of thumb of determining compliance threshold (Delespaul, 1995; Palmier-Claus et al., 2011). Taking into account the more recent debate on whether or not to exclude individuals in the analyses based on this threshold (Kirtley, 2021), we still chose to hold the threshold since we aim to measure a highly variable construct (fluctuations in momentary self-esteem) measured throughout the day, and argue that the representative characterization and, hence, ecological validity would be compromised when allowing participants with low compliance. Furthermore, findings on included vs. excluded participants (as shown in Table 3) suggest that exclusion did not

yield substantial (selection) bias. In addition, it would not be possible to compute the variability and instability of momentary self-esteem with only one measurement per day. Thereby it has to be taken into account that estimates of lagged effects may become less reliable when including many missed assessment points as it cannot be assumed that the missing assessment points occur at random (Trull & Ebner-Priemer, 2020).

Further, the level of self-esteem was not experimentally manipulated and the ESM-data on associations between momentary self-esteem, variability in self-esteem, and psychotic experiences, were cross-sectional; therefore, it is unknown to what extent temporal priority, and other criteria for establishing causality, were met for these associations (Reininghaus, Depp, & Myin-Germeys, 2016). However, instability in self-esteem was computed in such a way to involve temporal priority over psychotic experiences. Nonetheless, drawing conclusions on causality regarding momentary self-esteem and psychotic experiences remains difficult in itself since there are numerous unmeasured factors, such as genetic vulnerability, that may have confounded, interacted with, or mediated the effect of self-esteem on the socio developmental pathway to psychosis (Jongeneel, Pot-Kolder, Counotte, van der Gaag, & Veling, 2018; Klippel et al., 2017; Morgan & Gayer-Anderson, 2016; Morgan et al., 2014; Turley, Drake, Killackey, & Yung, 2019; Zeigler-Hill, 2011). Whilst the present study could not determine to what extent criteria for establishing causality were met, it did partially substantiate the view that low self-esteem may not only be a consequence of illness chronicity but is negatively associated with psychotic experiences along the entire continuum of psychosis, from controls through ARMS to FEP. However, when interpreting findings regarding the continuum of psychosis, caution must be applied, as the transition rate from ARMS to psychotic disorder is inconclusive and recent debate is ongoing regarding the ARMS concept (Ajnakina, David, & Murray, 2019; Moritz, 2019; A. R. Yung, Wood, S. J., Malla, A., Nelson, B., McGorry, P., & Shah, J.), thus ARMS cannot be fully attributed as a prodromal state for psychosis (Lee, Lee, Kim, Choe, & Kwon, 2018; Lin et al., 2015; Wigman et al., 2012).

Lastly, consistent with the most prominent self-report measure of self-esteem in the extant literature, i.e. the Rosenberg Self-Esteem Scale (Rosenberg, 1965), and with previous research using the ESM, which focuses on achieving high reliability through a high number of repeated measures (rather than a high number of items) (Pavlickova et al., 2015; Thewissen et al., 2008; Thewissen et al., 2011; Udachina et al., 2009), we combined items of negative and positive self-esteem into an overall self-esteem score. A note of caution is due here since the mean score constitutes of only two items and both of different representations of self-esteem. In the current study, we found an internal consistency of Cronbach's $\alpha = 0.36$. While this suggests a low internal consistency for this measure, it is what one would expect given self-esteem is a heterogeneous construct involving both negative and positive self-esteem (Udachina et al., 2009). While acknowledging the

need for methodological advances, the strengths of being able to assess momentary self-esteem repeatedly over time in daily life and additionally measure and analyse temporal changes in momentary self-esteem, made ESM the preferred choice for the aims of the present study (Granholm, Loh, & Swendsen, 2008; Kenny, Dooley, & Fitzgerald, 2016; Myin-Germeys, Delespaul, & van Os, 2003; Myin-Germeys et al., 2018; Myin-Germeys et al., 2009; Oorschot, Kwapil, Delespaul, & Myin-Germeys, 2009).

Conclusions

The findings of the current study suggest momentary self-esteem fits within a framework of phenomenological continuity where it is associated with psychotic experiences along the psychosis continuum, on all the in the current study measured levels. However, regarding reciprocal temporal associations between (fluctuations in) momentary self-esteem and psychotic experiences, findings did not show a linear increase in the magnitude of associations from controls via ARMS to FEP but rather a threshold effect was evident. Self-esteem as such could be a be target using ecological momentary interventions aimed at reducing the intensity of psychotic experiences and preventing illness progression at an early stage. Furthermore, it is of possible transdiagnostic clinical relevance since psychotic experiences are not only present in psychosis.

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Chapter 4

Investigating whether childhood abuse modifies associations between momentary self-esteem and psychotic experiences in daily life: an experience sampling study

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In preparation.

Chapter 5

Efficacy of a transdiagnostic ecological momentary intervention for improving self-esteem (SELFIE) in youth exposed to childhood adversity: study protocol for a multi-centre randomized controlled trial

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Abstract

Background

Targeting low self-esteem in youth exposed to childhood adversity is a promising strategy for preventing adult mental disorder, but psychological help remains difficult to access and accept for youth, calling for novel, youth-friendly approaches. Mobile Health (mHealth) and, most prominently, ecological momentary interventions (EMIs) provide a unique opportunity to deliver youth-friendly, personalized, real-time, guided self-help interventions. The aim of this study is to investigate the efficacy of a novel, accessible, transdiagnostic ecological momentary intervention for improving self-esteem ('SELFIE') in youth with prior exposure to childhood adversity.

Methods/design

In a parallel-group, assessor-blind, multi-centre randomized controlled trial, individuals aged 12–26 years with prior exposure to childhood adversity and low self-esteem will be randomly allocated to SELFIE in addition to treatment as usual (TAU) as the experimental condition or the control condition of TAU only, which will include access to all standard health care. SELFIE is a digital guided self-help intervention administered through a smartphone-based App to allow for interactive, personalized, real-time and real-world transfer of intervention components in individuals' daily lives, blended with three training sessions delivered by trained mental health professionals over a 6-week period. Outcomes will be assessed at baseline, post-intervention, and 6-month follow-up by blinded assessors. The primary outcome will be the level of self-esteem as measured with the Rosenberg Self-Esteem Scale (RSES).

Discussion

The current study is the first to establish the efficacy of an EMI focusing on improving self-esteem transdiagnostically in youth exposed to childhood adversity. If this trial provides evidence on the efficacy of SELFIE, it has significant potential to contribute to minimizing the deleterious impact of childhood adversity and, thereby, preventing the development of mental disorder later in life.

Introduction

The majority of mental disorders first emerge in youth and, as such, contribute substantially to disease burden, which is higher in youth than during any other developmental period (1-5). More specifically, 50% of lifetime cases of mental disorder have started by age 14 years and three quarters by age 24 (2, 6). Mental disorders in youth aged 10-24 years are associated with an immense cost (7-9) and have been found to be the leading cause of disease burden in high-income countries (4, 5). Onset of a mental disorder may disrupt critical age-specific developmental, interpersonal, occupational and educational milestones (10-12) and indicates a need for close scrutiny of the complex interplay between risk and protective factors in childhood and adolescence. Recently, transdiagnostic frameworks have become more prominent (e.g. the Hierarchical Taxonomy of Psychopathology (HiTOP) (13, 14), which broadly posit that symptoms of psychopathology are transdiagnostic in the early stages (15) and might result in a wide range of psychopathology later in life (12, 16). Furthermore, during the ongoing COVID-19 pandemic, measures to control SARS-CoV-2 transmission rates have been shown to have negative effects on mental health, especially in youth (17-19). All this highlights the value of transdiagnostic preventive interventions to improve well-being and resilience in youth and prevent morbidity later in life in order to reduce burden for individuals, families and the wider society (2, 11, 20-22).

Youth referred to mental health services have experienced disproportionate levels of childhood adversity (i.e. abuse, neglect, bullying and household discord) (23-31), which is one of the most pervasive risk factors for developing a range of mental disorders (25, 32, 33). For example, in a nation-wide Dutch study of help-seeking adolescents and young adults with an Ultra High Risk state for Psychosis (UHR), a high prevalence was found for physical (20.9%), sexual (24.8%) and emotional (46.7%) abuse, as well as physical (41.9%) and emotional (66.7%) neglect (29). Also, in a study based on a representative sample drawn randomly from the general population in the Netherlands, it was shown that 29.7% experienced one or more adversities during their childhood (34). Current estimates of attributable risks further suggest that interventions targeted at averting childhood adversity from exerting its adverse effects can prevent a substantial proportion of the incidence of adult mental disorder, and, thereby, have a sizeable public health impact and reduce societal costs (26, 35). While primary prevention of childhood adversity through universal, population-based strategies is of prime importance, it remains difficult to achieve for all, and, hence, interventions targeting the negative psychological consequences of childhood adversity in youth are a promising selective prevention strategy for adverse outcomes later in life with tangible public health implications (31, 36).

One important psychological mechanism in pathways from childhood adversity to adult psychopathology is low self-esteem (37, 38). Youth is a critical period for the development

of self-esteem. Self-esteem is essential to well-being and mental health per se, with a substantial impact on the development and maintenance of severe mental disorders (39). There is now substantial evidence to suggest that exposure to childhood adversity has detrimental effects on self-esteem (40-43). The current evidence further suggests that childhood adversity exerts its detrimental effects on risk of later psychopathology precisely via pathways through low self-esteem (36, 37, 44-47). The prevalence of low self-esteem in help-seeking youth has been reported to be around 45% (48). Taken together, targeting low self-esteem at an early stage in youth exposed to childhood adversity is a promising strategy for preventing mental disorder and reducing societal costs.

Current psychological help, including prevention, however, remains difficult to access and accept for youth and has limited efficacy under real-world conditions, calling for novel approaches (49, 50). While conventional interventions have proven efficacious in reducing psychiatric symptoms via enhancing self-esteem (51), a key next step is to develop and evaluate interventions that are specifically geared toward the specific needs of youth. This is what the current study is designed to achieve. The recent advances in information and communication technologies have led to the development of mobile Health (mHealth) interventions and, most prominently, ecological momentary interventions (EMIs) (52-56). EMIs provide a unique opportunity to deliver youth-friendly, accessible, personalized, real-time, guided self-help interventions targeting candidate psychological mechanisms in daily life and, thereby prevent mental disorder and reduce disease burden. This enables youth to access interventions that are individually adapted to their needs in a given moment and context (e.g., by offering interventions specifically tailored for helping participants in moments of low self-esteem). Recently, the term 'Just-In-Time Adaptive Interventions (JITAIs)' has been started to be used by some authors (57, 58), positing that novel characteristics of JITAIs are that interventions are initiated by push notifications and dynamically initiated by the app. However, these features have been part of EMIs from the outset, and, hence, if anything JITAIs may be used synonymously with EMIs, which have been proposed at a much earlier point. EMIs are ideally placed for enhancing access to mental health services for youth depending on their needs and preferences by delivering low-threshold interventions by mental health professionals as one component that can be rolled out across child, adolescent and adult mental health services.

Previous studies of conventional interventions suggest that psychiatric symptoms, such as anxiety and depression symptoms, may be reduced through enhancing self-esteem (51). However, these interventions are not tailored toward the specific preferences and needs of youth as naturally occurring in daily life. While EMIs such as the SELFIE intervention provide a unique opportunity to deliver youth-friendly, accessible, personalized, real-time interventions in daily life, robust trial-based evidence on EMIs and other mHealth interventions remains very limited (22, 52, 53, 59-62).

The overall aim of the current study is to test the efficacy of a novel, accessible, transdiagnostic ecological momentary intervention (EMI) for improving self-esteem ('SELFIE') in youth aged 12-26 with prior exposure to childhood adversity in a multi-centre randomized controlled trial (RCT). The SELFIE intervention will be administered in addition to treatment as usual (TAU) (experimental condition) and compared to a control condition of TAU only, which will include (access to) standard health care.

The specific objectives of this study are to:

1) Test the efficacy of the SELFIE intervention on improving self-esteem at post-intervention and 6-month follow-up (primary outcome);
2) Test the efficacy of the SELFIE intervention on improving momentary self-esteem, positive and negative schematic beliefs of self, resilience, emotional well-being, general psychopathology, functioning, and quality of life at post-intervention and 6-month follow-up (secondary outcomes);
3) Establish whether the effects of the SELFIE intervention on primary and secondary outcomes hold at 18-month and 24-month follow-up;
4) Examine the cost effectiveness and cost utility of the SELFIE intervention;
5) Assess the acceptability, safety, adherence and fidelity of the SELFIE intervention.

Methods

Study design

In a two-arm parallel-group, assessor-blind multi-centre randomized controlled trial, individuals aged between 12 and 26 years with prior exposure to childhood adversity and low self-esteem will be randomly allocated to SELFIE in addition to TAU as the experimental condition or a control condition of TAU only, which includes (access to) standard health care and social services. Participants will be recruited from mental health services in Noord-Holland, Zuid-Holland and Limburg (the Netherlands), and from the general population (e.g., via social media). Outcomes will be measured at baseline (i.e., before randomization), post-intervention (i.e., after the 6-week intervention period), and 6-month, 18-month and 24-month follow-up (i.e., 6, 18 and 24 months after completing the intervention period) by blind assessors (see figure 1 and 2). Randomization will be conducted independently of the research team through a computer-generated sequence, stratified by region of collaborating centres or as external admission. All outcomes will be measured and the statistical analysis will be performed blind to treatment allocation.

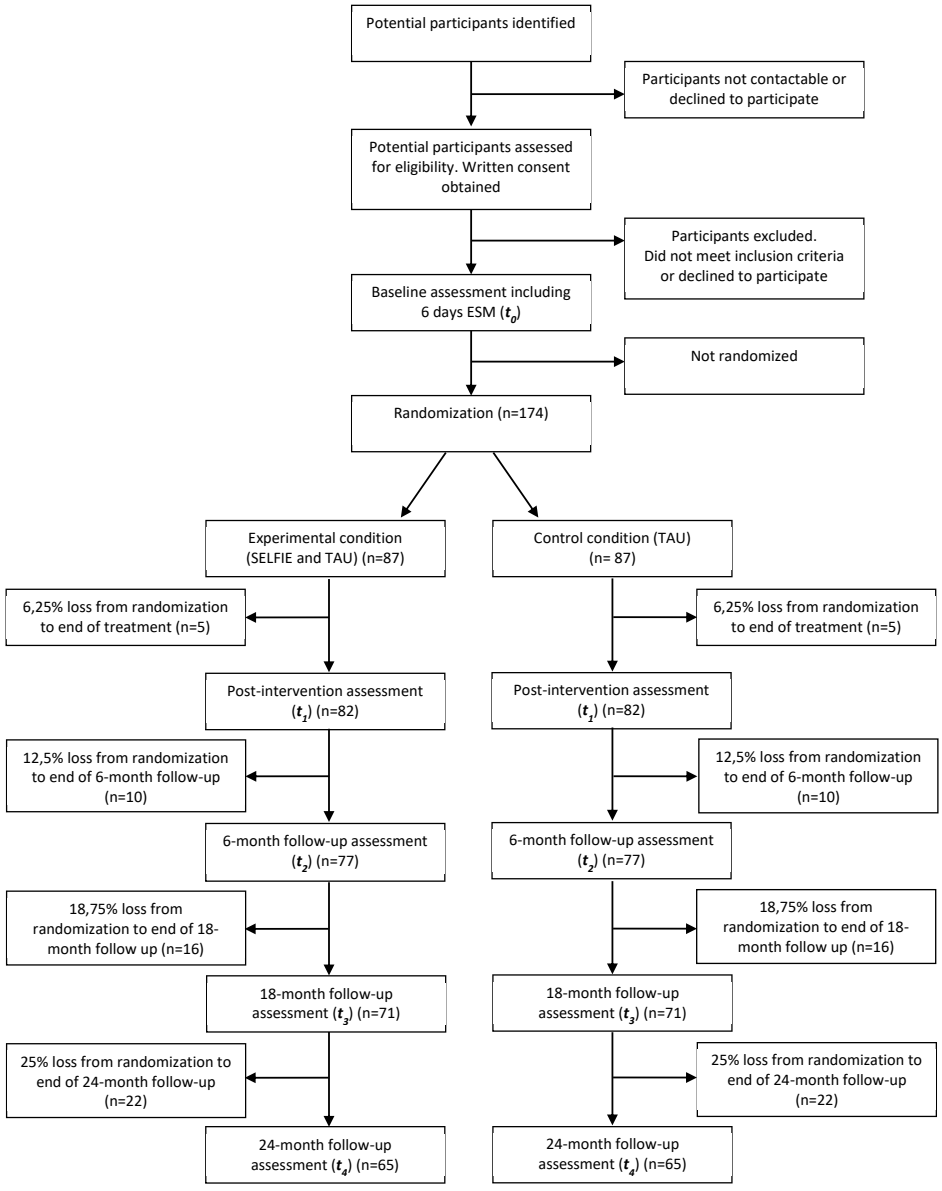

Figure 1. Overview of the study design

Participants

A sample of 174 individuals aged 12-26 with prior exposure to childhood adversity and low self-esteem will be recruited. Participants will be recruited from collaborating mental health services in three regions in the Netherlands: Noord-Holland (Amsterdam University Medical Centers (Location AMC); Levvel), Zuid-Holland (Parnassia Group; Prodeba)

and Limburg (Mondriaan; Lionarons GGZ; Koraalgroep). In addition, participants from the general population, who do not seek help from collaborating mental health services, will be recruited e.g. via (targeted adverts on) social media, schools, social services, and flyers at relevant public locations. All individuals presenting to collaborating mental health services will be approached by their treating clinician, who will provide initial information about the study. If the individual is interested in the study, their treating clinician will, in agreement with the potential participant, pass on their contact details to the research team. All potential participants (including those recruited via social media, etc.) will be contacted by the research team and will be fully informed about the study. One week later informed consent will be obtained (if applicable, also from parents/legal guardians), which can be withdrawn by participants at any time and without having any negative consequences for their access to standard health care). For participants under the age of 16, both parents (or the legal guardian) and participants will receive detailed information about the intervention. In addition, parents (or the legal guardian) and the researcher will consider possible negative reactions of the underage participant to the intervention procedure. Further, it will be determined together with the parents (or the legal guardian) prior to the intervention what the researcher will do in case of reluctance of the underage participant and which behaviour of the participant commonly reflects reluctance. It will be discussed with the parents (or the legal guardian) when the study should be stopped in case of reluctance of their child.

Potential participants will then be asked to complete the screening questionnaires to assess whether they meet the inclusion criteria. Participants aged 16 years or older will be financially compensated for their time, and travel expenses will be fully reimbursed. To minimize loss to follow-up, researchers maintain contact with participants on a regular basis. Also, participants will receive a small additional financial reimbursement for completing all follow-up assessments.

Inclusion criteria

Inclusion criteria are as follows (see table 1 for more detail): 1) aged between 12 and 26 years, 2) exposure to childhood adversity (physical, sexual or emotional abuse, emotional or physical neglect, peer bullying or parental conflict), 3) self-esteem below average measured with the Rosenberg Self-Esteem Scale (RSES) (51, 63, 64), 4) willingness to participate, 5) ability to give informed consent, and 6) parental consent for minors.

Exclusion criteria

Subjects will be excluded if their command of Dutch is insufficient or if their psychiatric symptoms are due to an organic cause.

Table 1 Eligibility criteria

Inclusion criteria
1) Aged between 12 and 26 years old.
2) Adversity: a. Childhood trauma: Prior exposure to at least one form of childhood trauma defined as moderate or severe physical (score ≥ 10), sexual (score ≥ 8) and/or emotional (score ≥ 13) abuse, emotional (score ≥ 15) and/or physical (score ≥ 10) neglect, according to established severity categories of the Childhood Trauma Questionnaire (CTQ) (65-67), and/or b. Peer bullying: Exposure to moderate or severe peer bullying, measured with the Retrospective Bully Questionnaire (RBQ) (score of frequency of bullying in one or more ways "sometimes" or more often and/or classified the experience as "quite serious" or "extremely serious") (68), and/or c. Parental conflict: A score of moderate or severe parental conflict, measured with the Childhood Experiences of Care and Abuse Questionnaire (CECA.Q) section Parental Conflict (frequency score of "regularly" or "often" and/or a severity score of "serious" or "violence") (69).
3) Self-esteem below average (measured with the Rosenberg Self-Esteem Scale (RSES) (score <26) (51, 64).
4) Willingness to participate in the SELFIE intervention.
5) Ability to give written informed consent.
6) Parental consent for minors.
Exclusion criteria
1) Insufficient command of Dutch
2) Psychiatric symptoms due to an organic cause

Intervention

Control condition: treatment as usual (TAU)

Participants allocated to the control condition will receive treatment as usual (TAU), which will include access to all standard health care and social services. Specifically, this will include all the input from their general practitioner and other providers of health and social services that they would receive if they did not participate in the study, except for manualized treatment that explicitly addresses self-esteem as primary target (e.g., COMET or EMDR (51, 70, 71)) during the intervention period.

Experimental condition: SELFIE + TAU

Participants allocated to the experimental condition will receive the manualized SELFIE intervention within a 6-week period in addition to TAU. The intervention consists of three face-to-face sessions, each for around 60 minutes, delivered by SELFIE therapists, who will be trained mental health professionals (e.g., psychologists, social workers and

mental health nurse specialists trained in the SELFIE intervention and receiving regular supervision and inter-vision led by a clinical psychologist), three e-mail contacts, and an EMI administered through a smartphone-based App (i.e., the PsyMate® App) for adaptive real-time and real-world transfer of intervention components tailored to person, moment and context, delivered over a 6-week intervention period. Due to the COVID-19 pandemic, some of the face-to-face sessions will be offered through a secure and encrypted video conferencing system. The intervention is based on principles of EMIs (22, 52-56, 62, 71), and a guided self-help approach using principles of cognitive-behavioural therapy (CBT), aimed at modifying cognitive bias inherent to negative self-esteem and developing and practicing a new behavioural repertoire guided by therapists using modeling and shaping as additional important therapeutic techniques (72, 73). Delivering the intervention in individuals' daily lives, and enabling youth to benefit from this intervention in a given moment and context, when most needed (e.g. in moments of low self-esteem) is the key goal of the 6-week SELFIE intervention. Therefore, in the first introductory session, participants will either receive a study smartphone with the App already installed or will be asked to install it on their own smartphone by the SELFIE therapist, who will explain the SELFIE intervention in detail and ask the participant to complete examples of training tasks on the App in order to address the self-selected goals the participant wants to work on in the 6-week intervention period. The App will offer participants 'enhancing', 'consolidating' and 'interactive' tasks (see table 2) (72, 73). In enhancing tasks, new intervention components will be introduced and practiced, some of which will be modified and extended over the study period. Consolidating tasks will ask participants to practice previously learned components of enhancing tasks on a daily basis. For these tasks, participants will be reminded by the app between 1-3 times per day (varying by intervention week). During the intervention period, the Experience Sampling Method (ESM), a structured dairy technique, will be used to assess momentary self-esteem, affect, and pleasantness of activities and events, six times a day, on day 3, 4 and 5 in each of the six intervention weeks using a time-based design with stratified random sampling (i.e., with ESM assessments scheduled at random within set blocks of time) to allow for interactive tasks. Interactive tasks will be provided based on their ESM ratings of (positive and negative) affect, momentary self-esteem and pleasantness of activities and events. For example (in week 1), participants will be provided with an interactive task, offering them to add more successes to their positive datalog when they scored high on positive affect, momentary self-esteem and/or pleasantness of activities. Participants can discontinue the intervention at any time upon request without negative consequences.

Outcome measures

After obtaining written informed consent and eligibility assessment, participants will complete a range of self-report, interview-based and computer-based measures to assess primary and secondary outcomes and other study parameters. Participants will complete

Table 2. Key components of the SELFIE intervention

SELFIE intervention (weeks)						
	1	**2**	**3**	**4**	**5**	**6**
Training session	Face-to-face session 1	E-mail contact 1	Face-to-face session 2	E-mail contact 2	Face-to-face session 3	E-mail contact 3
Enhancing EMI tasks	Formulating a new positive core belief + Positive datalog (enter daily successes)	Personal positive qualities (integrated in positive datalog) + Tips to identify more positive qualities + One-minute exercise (listing (previously identified) positive qualities)	Overview old behavioral patterns + Development of new behavior patterns	Expanding the positive datalog with successes arising from new behavioral patterns	Strategies to deal with criticism + A critical look at criticism + Cost-benefit analysis of perfectionism + The minimum programme (practicing to perform less than perfect)	Writing a positive story about yourself + Maintenance plan (for after the intervention)
Consolidating EMI tasks	Positive datalog + Tips to add more successes in the positive datalog + Rating credibility of the new core belief	Positive datalog + Tips positive datalog + One-minute exercise + Rating credibility of the new core belief	Positive datalog + One-minute exercise + Rating credibility of the new core belief	Positive datalog + One-minute exercise + Expanding new behavior patterns + Rating credibility of the new core belief	Positive datalog + One-minute exercise + A critical look at criticism + Rating credibility of the new core belief	Positive datalog + One-minute exercise + Rating credibility of the new core belief

	1	2	3	4	5	6
Training session	Face-to-face session 1	E-mail contact 1	Face-to-face session 2	E-mail contact 2	Face-to-face session 3	E-mail contact 3
Interactive EMI tasks	Positive datalog (adding successes) Or Positive datalog (viewing previously identified successes)		Positive datalog (adding successes and/or positive qualities) Or Positive datalog (viewing previously identified successes and qualities)		A critical look at criticism	

Note: see Postma (73) and De Neef (72) for more details.

self-report questionnaires using a smartphone-based App (i.e., the PsyMate® App). Interviews will be conducted using a secure and encrypted video conferencing system. In addition, ESM data will be collected following the protocol from previous ESM studies using the PsyMate® App to measure momentary self-esteem, emotional well-being, stress sensitivity, threat anticipation, and psychotic experiences in daily life for a period of 6 consecutive days (22, 31, 62, 74-76). On each day, participants will be asked eight times per day to complete an ESM, which will be scheduled at random within set blocks of time. At the end of the 6-day baseline ESM period, participants will be asked to complete a short debriefing questionnaire. All the above-mentioned measures will be assessed at baseline (i.e. before randomisation), post-intervention (i.e. after the 6-week intervention period) and 6-month follow-up. Please see Figure 2 (SPIRIT Figure) for details of assessment at each time point. All assessments will be checked for quality and completeness by another member of the research team and an extensive data checking and cleaning will be adhered to as a quality control measure.

Primary outcome

The primary outcome will be global self-esteem, measured with the Rosenberg Self-Esteem Scale (RSES) (63), which is a widely used measure to assess global self-esteem with good reliability and validity (64, 77). The RSES consists of ten items rated on a 4-point Likert scale ranging from 'strongly agree' to 'strongly disagree'. The level of global self-

esteem, operationalized as the total score of the RSES, will be compared between the experimental and the control condition at post-intervention and 6-month follow-up (H1).

Secondary outcomes

Secondary outcomes will include the level of momentary, positive and negative self-esteem, resilience, emotional well-being, positive and negative schematic beliefs of self, psychological distress, functioning, subjective quality of life, general psychopathology, clinical symptoms and health-related quality of life, service use (including admission to inpatient services) and cost, which will be compared between the experimental and control condition at post-intervention and at 6-month follow-up (H2). In addition, all secondary outcomes (incl. levels of global self-esteem, operationalized using the total score of the RSES (see previous section)) will be compared between the experimental and control condition and at 18- and 24-month follow-up (H3).

Momentary self-esteem will be assessed with four items, rated on a 7-point scale, using the ESM (78, 79). The mean score will be used for analysis. Positive and negative self-esteem will be measured with the SERS, which is a 20-item rating scale to assess these two dimensions of self-esteem separately with good reliability and validity (80). The total sum score of the positive dimension and the total sum score of the negative dimension will be used in the analysis. Momentary resilience will be assessed with the ESM positive affective recovery from event-related stress in daily life (operationalized as the return to baseline levels of positive affect following event-related stress) (31, 74, 76, 81). We will assess emotional well-being using the Positive and Negative Affect Scale (PANAS) (82) based on the total sum score of the negative affect items, and the total sum score of the positive affect items. Also, a 5-item ESM measure will be used for assessing negative affect and a 4-item ESM measure of positive affect (31, 74, 83). For both measures, a mean score will be used in the analysis. The Brief Core Schema Scale (BCSS) will be used as an established measure of positive and negative schematic beliefs of self and others (84). The following four total scores (all consisting of six items) will be obtained for use in the analysis: negative-self, positive-self, negative-others, positive-others. Psychological distress will be measured with the Kessler Psychological Distress Scale (K10), which is widely used and well-validated in youth (85, 86). A total sum score ranging from 10 to 50 will be used for analysis.

The Social and Occupational Functioning Assessment Scale (SOFAS) (87) and the Global Assessment of Functioning (GAF) scale (88) will be used as a well-validated measure of functioning in youth (86). The overall level of functioning rated by researchers on a scale of 0 to 100 will be used in the analysis.

			STUDY PERIOD				
	Enrolment		Allocation	Post-allocation			
TIMEPOINT**	$-t_1$	t_0 *Baseline*		t_1 *post-intervention*	t_2 *6-month follow-up*	t_3 *18-month follow-up*	t_4 *24-month follow-up*
ENROLMENT:							
Informed consent	X						
Childhood Trauma Questionnaire (CTQ)							
Parental Conflict (CECA)	X						
Retrospective Bullying Questionnaire (RBQ)	X						
Rosenberg Self-Esteem Scale (RSES)	X						
Screening Questionnaire	X						
Allocation			X				
INTERVENTIONS:							
Experimental condition (SELFIE + TAU)			◆——	——◆			
Control condition (TAU)			◆——	——◆			
ASSESSMENTS: Outcome measures							
Ecological Momentary Assessment (EMA) questionnaire		X		X	X	X	X
EMA briefing questionnaire		X		X	X	X	X
EMA debriefing questionnaire		X		X	X	X	X
Self-Esteem Rating Scale (SERS)		X		X	X	X	X
Rosenberg Self-Esteem Scale (RSES)		X		X	X	X	X
Brief Core Schema Scales (BCSS)		X		X	X	X	X
Temperament and Characteristic Inventory (TCI)		X					
Kessler Psychological Distress Scale (K10)		X		X	X	X	X
Symptom Checklist (SCL-90-R)		X		X	X	X	X
Positive and Negative Affect Scale (PANAS)		X		X	X	X	X
Social and Occupational Functioning Assessment Scale (SOFAS)		X		X	X	X	X
Global Assessment of Functioning (GAF)		X		X	X	X	X
World Health Organisation Quality of Life Instrument-Brief (WHOQOL-BREF)		X		X	X	X	X
Brief Psychiatric Rating Scale (BPRS)		X		X	X	X	X
Trimbos Institute and Institute of Medical Technology Assessment Questionnaire for Costs associated with Psychiatric Illness (TiC-P)		X		X	X	X	X
EQ-5D 3-level version of the 'EuroQoL' group (EQ-5D-5L)		X		X	X	X	X
Other study parameters							
Socio-demographic schedule		X					
Composite International Diagnostic Interview (CIDI-B-J-L)		X					
Medication use		X		X	X	X	X
Treatment Classification (present and past)		X		X	X	X	X
CECA (social support)		X					
Working Alliance Inventory (WAI)				X			
Debriefing questionnaire: SELFIE Intervention				X			
Debriefing questionnaire: SELFIE Follow-Up					X	X	X
Qualitative interview (process evaluation)				X			

Figure 2. Standard Protocol Items: Recommendations for Interventional Trial (SPIRIT) Figure. Ecological momentary intervention for improving self-esteem (SELFIE): Schedule of enrolment, interventions and assessments.

Subjective quality of life will be measured with the World Health Organisation Quality of Life Instrument-Brief (WHOQOL-BREF) (86, 89). Mean scores of all four domains (physical health, psychological, social relationships, environment) will be used. The revised Symptom Checklist (SCL-90-R) will be used as a reliable and valid measure to assess general psychopathology in youth (86, 90). The measure consists of 90 items, which will be rated on a 5-point scale. The total sum score of the SCL-90-R will be used for analysis. We will use the 24-item version of the Brief Psychiatric Rating Scale (BPRS) (91, 92) as a validated interviewer measure to assess clinical symptoms of psychopathology in youth (86). All items are rated on a 7-point scale and, for the analysis, the BPRS total score will be computed.

The Trimbos Institute and Institute of Medical Technology Assessment Questionnaire for Costs associated with Psychiatric Illness (TiC-P) (93) will be used to collect data on service use (including admission to inpatient services) and cost for cost-effectiveness analysis. Last, data on health-related quality of life will be operationalized by quality-adjusted life years (QALYs), which will be calculated based on the EQ-5D 5-level version of the 'EuroQoL' group (EQ-5D-5L) for cost-utility analysis (94).

Process evaluation

A process evaluation will be performed following the methodology of realist evaluation (95). Initial program theories will be developed based on transcribed data from a focus group with stakeholders as well as expert interviews. Overarching program theory and accompanying context-mechanism-outcome configurations will be tested among intervention users (individual interviews with participants who have completed the SELFIE intervention) as well as those who deliver the intervention (focus group with SELFIE therapists), through iterative data collection. Atlas.Ti will be used as software to support the process of our analyses.

Acceptability, adherence and fidelity

We will carefully assess acceptability, safety, adherence and fidelity of the SELFIE intervention. Participants in the experimental condition will be asked to complete a debriefing questionnaire, which assesses acceptability, satisfaction, and whether or not there were beneficial effects of the EMI tasks and sessions. Also the Working Alliance Inventory (WAI) (96) will be completed by the participant and the SELFIE therapist providing the SELFIE intervention. Adherence to the intervention will be assessed using the implicit EMI adherence data recorded by the App (e.g. number and duration of completed EMI interactive, enhancing and consolidating tasks). Further, the attended face-to-face sessions will be audio recorded and adherence will be rated on a visual analogue scale (ranging from 0 = 'not at all' to 11 = 'very much') by a clinical psychologist or researchers (supervised by a clinical psychologist).

Other measures

A socio-demographic schedule will be used to assess basic socio-demographic and clinical characteristics including age, gender, employment status and level of education. Resilience will be assessed with the Temperament and Characteristics Inventory (TCI) (97). Last, other confounders, such as alcohol and substance use (Composite International Diagnostic Interview (CIDI), sections B, J and L)) (98), medication use, treatment classification, and social support (Childhood Experience of Care and Abuse (CECA), section social support) (69) will also be assessed.

Sample Size

Previous studies demonstrated that third-wave cognitive behavioral therapy (CBT) (22, 99, 100), including CBT focusing on self-esteem (51, 101), may lead to reductions in symptoms of psychopathology of moderate to large effect size. In line with previous research, the power calculation is based on the primary outcome of level of self-esteem as measured with the RSES (51). Power simulation in the R environment indicated that a sample size of 130 participants (65 per condition) is sufficient to test our primary hypothesis of the effect of condition (SELFIE + TAU vs. TAU) on self-esteem, while controlling for self-esteem at baseline. Specifically, this will allow us to detect an effect size (standardized mean difference (SMD)) of 0.3 (experimental vs. control condition), i.e., a difference that is considered clinically relevant, at (at least) post-intervention or 6-month follow-up with a power of 0.87 (primary hypothesis), and, at long term, (at least) at one of the post-intervention and follow-up time points (6-month, 18-month and 24-month follow-up), with a power of 0.82 when testing at alpha=0.05 using linear mixed modelling. Based on our previous and ongoing work, we will allow for a 25% attrition rate at 2-year follow-up, which will result in a loss to follow-up of around 22 individuals per condition on average (see figure 1). Hence, we will recruit a total sample of 174 participants (87 experimental, 87 control condition) at baseline.

Randomization and blinding

Each participant will be randomized at a 50:50 ratio to the experimental or control condition after completing the baseline assessment. Randomization will be conducted through a computer-generated sequence, stratified by region of a collaborating centre or as external admission. The assessors will be blind to the allocation of subjects when assessing participants at post-intervention, 6-month, 18-months and 24-month follow-up. After random allocation to the experimental condition, the names and contact details of the participants will be passed on to the SELFIE-therapist providing the SELFIE intervention. This will be done through an independent researcher. This researcher will inform the assessors when assessments at post-intervention and follow-up need to take place for each individual participant. The design of this study is single blinded, because SELFIE therapists and patients cannot be masked towards the allocation of patients to the

experimental or control condition. Any data specific to the intervention condition (e.g., on treatment fidelity) will be stored in a separate database. Any breaks in masking will be documented in the trial master file and another assessor will be allocated to complete the next set of assessments where possible.

Assessment of safety

Serious Adverse Events (SAE), which include any serious incidents that result in death, persistent or significant disability or incapacity, require (extension of) hospitalization or are life threatening, will be monitored and collected throughout the study period. In case of occurrence, SAEs will be reported to the accredited Medical Ethics Review Committee (MERC), the Data Monitoring and Ethics Committee (DMEC) and the Trial Steering Committee (TSC). Whilst carefully documented, it is not expected that any SAE will occur as a result of the intervention. The DMEC will advise on any ethical or safety concerns, monitor evidence for intervention harm (e.g. SAEs) for the experimental condition and review whether these events are in line with expectations. If deemed necessary, the DMEC can recommend to the Coordinator and TSC for interim analyses to be conducted and the trial to be terminated prematurely. All reported (serious) adverse events will be reported in publications of findings from this study.

Statistical analysis

A full statistical analysis plan will be written and published prior to unblinding of the study and before any analysis is being undertaken. The trial data set will be accessed by the investigators to test the primary hypothesis of an improvement in self-esteem at post-intervention and 6-month follow-up in a priori planned statistical analysis when data collection for assessments at 6-month follow-up has been completed whilst retaining masking of assessors until the last assessment of the last participant at 24-month follow-up. We will use a linear regression model with the primary outcome of self-esteem at post-intervention and 6-month follow-up entered as the dependent variable and self-esteem measured at baseline, condition (SELFIE + TAU vs. TAU), time (as a two-level factor), centre (as a four-level factor), the baseline × time interaction and a time × condition interaction term as independent variables, in line with the intention-to-treat principle. All randomized participants will be included in the analysis, and will be analyzed according to the intention to treat principle. Residuals within subjects will be allowed to be correlated with a completely unstructured variance-covariance matrix to take within-subject clustering of repeated measures into account. We will fit the model using Restricted Maximum Likelihood (REML (102)) in Stata 15 (103), which allows for all available data to be used assuming that data is missing at random if all variables associated with missing values are included in the model (104, 105). Therefore, potential bias due to attrition over the study period, differences between centres, or as a function of baseline self-esteem will be minimized by the model. We will make every effort to assess

all participants at post-intervention and follow-up. To test the main effect of condition, an omnibus test of no difference between the two conditions at all two time points (Wald-type test with df=2 and alpha = .05) will be used. The two time-specific contrasts will be examined if the omnibus test is statistically significant to determine at which time points significant differences are present (each tested at alpha = .05). The two time-specific contrasts (to determine at which time points significant differences are present) will only be examined if the omnibus test is significant and, hence, the family-wise Type I error rate of finding at least one significant difference at the three time points is controlled at alpha = .05. Hypotheses in relation to secondary outcomes of momentary self-esteem, positive and negative schematic beliefs of self, resilience, emotional well-being, general psychopathology, functioning, and quality of life at post-intervention and 6-month follow-up will be tested following the same steps. The investigators will access the trial data set to test hypotheses in relation to all four time points (i.e., post-intervention, 6-month, 18-month, and 24-month follow-up) in a priori planned statistical analysis when data collection for assessments at 24-month follow-up has been completed. For hypotheses in relation to primary and secondary outcomes at all four time points (i.e., post-intervention, 6-month, 18-month, and 24-month follow-up), the main effect of condition will be tested using, again, an omnibus test of no difference between the two groups at all four time points (Wald-type test with df=4 and alpha = .05). The four time-specific contrasts will be examined to determine at which time points significant differences are present (each tested at alpha = .05), if the omnibus test shows to be statistically significant. Since randomization will be performed in blocks, stratified by region of collaborating centre or as external admission, all analyses will include this as a covariate, even though it is not expected this variable will lead to bias. As participants will be randomly assigned to experimental and control condition, no differences across conditions are expected in other study parameters (socio-demographics, alcohol and substance use, medication use, treatment classification, social support and self-compassion). If, however, in contrast to what would be expected, there are significant differences at baseline in any of these parameters across conditions, these will be included as covariate(s) in analyses with primary and secondary outcomes as dependent variable. As ESM data have a multilevel structure, multiple ESM observations (level 1) will be treated as nested within time points (i.e., baseline, post-intervention and 6-month, 18-month, and 24-month follow-up) (level 2) and time points will be treated as nested within subjects (level 3).

Cost-effectiveness analysis (CEA) will be conducted based on service use and cost data collected using the TiC-P. Cost-utility analysis (CUA) will be conducted using quality-adjusted life years (QALYs), which will be calculated based on the EQ-5D-5L. For both CEA and CUA, the incremental cost-effectiveness ratio (ICER) will be calculated, which reflects the extra cost needed (or saved) per one unit increase in self-esteem or QALY gained, respectively.

Descriptive statistics will be used and confidence intervals constructed as appropriate to compute basic sample characteristics and summarize findings on acceptability, safety, and intervention fidelity of, as well as adherence to the intervention.

Interim analyses and stopping guidelines

Since it is not expected that any harm will occur related to participation in this study, there are no predefined stopping guidelines and no a priori planned interim analyses. The DMEC can recommend to the Coordinator and TSC for interim analyses to be conducted if deemed necessary because of any ethical or safety concerns.

Research governance

Maastricht University is the sponsor of this study. The trial has received ethical approval from the Medical Ethics Review Committee (MERC) at Maastricht University Medical Centre (MUMC), the Netherlands (reference: NL64393.068.17). Amendments to the study protocol will be submitted to the MERC for approval, then communicated to all relevant parties (DMEC, TSC, the sponsor, funder, and collaborating centres) and will be updated in the clinical trial registry. In case of deviations from the study protocol, a breach report form will be used for documentation. The handling of the data will be in compliance with the Dutch and European General Data Protection Regulation (GDPR). If a participant withdraws their consent, all data from that participant will be destroyed. No biological specimens will be collected in this trial. All data will be handled confidentially and will be coded using a number according the order of entry. In line with the GDPR, all data will be securely stored and personal data will be stored separately from the number-coded data. Consistent with the consortium agreement of this study, the Coordinator will have overall responsibility for the trial and will be responsible for the day-to-day management of the project. The Project Leader advices on, and supports, the Coordinator in the day-to-day management of the project. Each party (i.e., School for Mental Health and Neuroscience, Mondriaan, Levvel, Academic Medical Centre Amsterdam, Parnassia) appoints its lead scientist on the project as Principal Investigator (PI). The Coordinator and Project Leader will liaise closely with all PIs on recruitment and consent procedures. The Trial Management Committee will meet monthly and includes the Coordinator, the Project Leader and all PIs. It will be chaired by the Coordinator and will manage the day-to-day running of the study, audit the trial conduct, and oversee preparation of reports to the MERC, the TSC and the DMEC. The Coordinator will permit trial-related monitoring, audits and MERC review (conducted by the Clinical Trial Center Maastricht, which is independent from the study sponsor (i.e. Maastricht University)). The TSC will meet at least annually to provide independent overall supervision of the trial, to approve the protocol and any amendments and to monitor progress (e.g. data completion rates and adherence to the protocol). Also, the DMEC will meet at least annually. The DMEC will advise on ethical or safety concerns and, for the experimental condition, monitor evidence for intervention

harm (e.g. SAEs) and review whether these events are in line with expectations. The DMEC can recommend to the Coordinator and TSC to be given access to all trial data as well for interim analyses to be conducted and the trial to be terminated prematurely if deemed necessary.

Discussion

Exposure to childhood adversity may have deleterious effects on self-esteem, which, in turn, has been shown to be an important putative transdiagnostic mechanism in pathways from childhood adversity to adult psychopathology (37, 38), and thus, is a promising target for early intervention. Even though self-esteem is a common target of conventional psychological interventions (51, 71, 72, 101), current psychological help remains difficult to access for youth in real-world service delivery settings (49, 50), and therefore, new approaches are required. The current paper presents the study protocol of a multi-centre RCT to evaluate the efficacy of an EMI (SELFIE) to improve self-esteem in youth exposed to childhood adversity. SELFIE, an intervention that extends beyond or even outside the clinical setting, has been designed to improve the accessibility and efficacy of psychological interventions for youth exposed to childhood adversity (49, 50). The potential effects of the SELFIE intervention may help to minimize the deleterious impact of, and hence, resilience to, childhood adversity by improving self-esteem and, thereby, prevent the development of severe and enduring mental disorder later in life and reduce disease burden. This study contains several unique and novel aspects. To our knowledge, SELFIE is the first transdiagnostic EMI that focuses on improving self-esteem in youth exposed to childhood adversity, which will inform our understanding of self-esteem as a psychological mechanism as well as the growing knowledge of mHealth intervention development and implementation, in particular for EMIs. An advantage of EMIs is that the intervention components are delivered in, and therefore more easily translated to, diverse contexts of daily life (54). In doing so, the SELFIE intervention focuses on positive rather than negative self-esteem, that is, the goal of SELFIE is to build a competing positive self-esteem, without directly targeting more deeply rooted negative self-esteem (72). This makes this low-level intervention suitable as a guided self-help EMI that is easily accessible, individually tailored and offered in daily life. Also, the multi-centre RCT design implemented in different regions of the Netherlands will provide high external validity of findings. Cost effectiveness and cost utility will inform implementation, and the process evaluation on acceptability, treatment adherence, and treatment fidelity will provide important data on potential barriers, but also on potential facilitators for implementation.

Trial status

The trial has been registered at trialregister.nl (no. NTR 7475) in November 2018, and all study procedures were approved by the MERC at MUMC in August 2018. We are currently working with protocol version 10, originating from February 2021. Recruitment started in December 2018, the first enrollment was in January 2019, recruitment was completed in June 2021 and outcome assessment will continue until December 2022.

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SUPPLEMENTARY MATERIAL

Informed Consent Sheet (translated version, participants > 16 years old)

SELFIE

A new App-driven self-help intervention to increase self-esteem in youth exposed to childhood adversity.

- I have read the information letter and I got the opportunity to ask questions. My questions have been sufficiently answered. I had plenty of time to decide whether I want to participate.

- I know that taking part in this study is voluntary. I also know that I can decide at any time not to participate or to stop participation in the study. I do not have to provide a reason to stop my participation.

- I give permission to inform my primary care provider that I am participating in this study.

- I give permission for the collection and usage of my data to answer the research question in this study.

- I know that some persons have access to my data. These persons are listed in this information letter. I give permission to these persons to access my data.

- I give permission to inform my general practitioner and/or treating specialist about unexpected findings that are (or may be) important for my health.

- I give permission to be contacted by email during the intervention period.

- I know that the study phone may only be used for the research purposes (access to the PsyMate app). I will not use the phone for any other purpose.

Please delete as appropriate for the following questions.

- I *do / do not** give permission to request information from my main practitioner about psychological distress in the past and the use of medication.

- I *do / do not** give permission to record the three SELFIE sessions with the psychologist with a voice recorder.

- I *do / do not** give permission to contact me after this study for a follow-up study.

- I *do / do not** give permission to store my personal data longer to use it for future research in the field of trauma, self-esteem, or to further develop the intervention or the app.

I want to participate in this research.

Name participant:

Signature: Date : __ / __ / __

I declare that I have fully informed this participant about the study.

If information that could influence the subject's consent becomes apparent during the study, I will inform him/her in time.

Name researcher (or representative):

Signature: Date: __ / __ / __

Additional information has been provided by:

Name:

Function:

Signature: Date: __ / __ / __

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* Delete as appropriate.
The participant receives a complete information letter, together with a copy of the signed consent form.

Chapter 6

Investigating mechanisms in enhancing self-esteem in youth through an ecological momentary intervention: A realist evaluation within the SELFIE trial

Mary Rose Postma, Suzanne Vrancken, Maud Daemen, Iris Hoes-van der Meulen, Nele Volbragt, Dorien Nieman, Philippe Delespaul, Lieuwe de Haan, Marieke van der Pluijm, Josefien Johanna Froukje Breetvelt, Mark van der Gaag, Ramon Lindauer, David van den Berg, Claudi Bockting, Therese van Amelsvoort, Matthias Schwannauer, Lawrence Doi, Ulrich Reininghaus

In revision.

Chapter 7

Working mechanisms of the use and acceptability of ecological momentary interventions: An evaluation of a guided self-help ecological momentary intervention targeting self-esteem.

Mary Rose Postma, Suzanne Vrancken, Maud Daemen, Iris Hoes-van der Meulen, Nele Volbragt, Philippe Delespaul, Lieuwe de Haan, Marieke van der Pluijm, Josefien Johanna Froukje Breedvelt, Mark van der Gaag, Ramon Lindauer, David van den Berg, Claudi Bockting, Therese van Amelsvoort, Matthias Schwannauer, Lawrence Doi, Ulrich Reininghaus.

Submitted.

Chapter 8

General discussion

Purpose of this dissertation

Research shows adolescence to be a period of high risk for the emergence of serious mental disorders (Kessler et al., 2005; Singh, 2009; Solmi et al., 2022), and early intervention is necessary to prevent more severe mental health problems later in life (Corell et al., 2018; McGorry, 2015; McGorry et al., 2018). Literature on the emergence of serious mental health conditions and pathways to psychopathology shows that the experience of childhood adversity impacts mental health (Kessler et al., 2010; Matheson et al., 2013). Further, findings suggest self-esteem to be a putative mechanism on this pathway from childhood adversity to psychopathology (Brown et al., 2008; Garety et al., 2007). Thus, there is a need for (early) intervention, focusing on the crucial developmental period of 12-25 years and targeting transdiagnostic mechanisms such as self-esteem. However, the current psychological interventions on offer do not seem sufficient in reaching youth and may have limited efficacy under real-world conditions (Singh et al., 2010; van Amelsvoort, 2013). Therefore, this dissertation set out to gain a further understanding of self-esteem in the context of psychopathology and mental well-being in youth. Specifically, the main theme in the current dissertation concerned the SELFIE intervention under study in the SELFIE trial. The SELFIE trial investigated the efficacy and clinical feasibility of this smartphone-based guided self-help intervention to improve self-esteem in youth exposed to childhood adversity in a multi-center, parallel-group, assessor-blind randomized controlled trial (RCT). Further, this dissertation aimed to contribute to the limited amount of research on theory and effect of ecological momentary interventions (EMI) (Balaskas et al., 2021; Goldberg et al., 2022; Smith & Juarascio, 2019).

Main findings and conclusions

The main findings and reflections on this thesis are discussed in the following, structured around the three parts of this dissertation.

Youth mental healthcare (first part)

Our description of the working method of an innovative youth mental health (YMH) team in the Netherlands and the clinical characteristics of its population (Chapter 2) demonstrated that continuity of care around the critical age of 18 was met. This was done by being able to complete treatment within the same multidisciplinary team of professionals, by offering transdiagnostic treatment to facilitate a high rate of co-morbidity, and by obtaining a flexible approach to adjust interventions to the varying complexity and changing needs of this patient group. Further, we found beneficial effects of the described client-centered approach. The complexity of the patient population treated by this YMH team seems to be consistent with results in previous youth mental health research. This stresses the need for specialized mental healthcare to follow-up easy access services now being increasingly implemented worldwide (McGorry & Mei, 2018) (e.g. @ease in the

Netherlands (Leijdesdorff et al., 2022)) to offer accessible and fitting support or treatment along the continuum of severity of mental health problems. In addition, for both lower-level severity and more specialized mental healthcare, results suggest that youth mental healthcare should pay particular attention to psychosocial and environmental problems as they are closely linked to each other and call for an integrated approach to understand and treat them to prevent prolonged duration and poorer functional outcomes.

Self-esteem (second part)

The second part of this dissertation concerns research questions regarding self-esteem in the course of psychopathology. Firstly, (temporal) associations between momentary self-esteem, fluctuations in self-esteem, and psychotic experiences in daily life were examined (Chapter 3). Findings showed that individuals with first-episode psychosis (FEP), and individuals presenting an at-risk mental state (ARMS), experienced lower momentary self-esteem than controls. However, there was no evidence of a difference in levels of momentary self-esteem between FEP and ARMS. Further, associations between momentary self-esteem and psychotic experiences were present in FEP, ARMS, and controls. Regarding fluctuations in momentary self-esteem (coined as variability and instability), in all groups, no significant associations with psychotic experiences were found. If we now turn to temporal associations, findings may suggest a reciprocal temporal association between self-esteem and psychotic experiences.

Secondly, we investigated whether childhood abuse (emotional abuse, physical abuse, sexual abuse, and amount of exposure to different types of abuse) modified the association between momentary self-esteem and psychotic experiences in daily life, in ARMS, FEP, and controls (Chapter 4). We failed to show a modifying effect of abuse on the association between momentary self-esteem and psychotic experiences. Neither did we find an effect of modification by abuse when investigating the temporal order. These findings are contrary to previous studies that have suggested self-esteem to be a putative mechanism on the pathway from childhood abuse to psychosis (Fisher et al., 2013; Fisher et al., 2012; Gracie et al., 2007; Morgan et al., 2014). Reflecting on this, it should be taken into account that our findings were based on measurements in daily life and investigated the role of self-esteem as putative mechanism. However, neither do our results corroborate the findings of Daemen et al. (2023), which, to the best of our knowledge, is the only previous study examining these associations in daily life. Their results showed strong evidence that the association between self-esteem and psychotic experiences in daily life was modified by exposure to childhood physical and sexual abuse. Perhaps the smaller sample size of the current study (50 FEP, 44 ARMS, and 52 controls) versus the sample size examined by Daemen et al. (2023) (139 patients with psychotic disorders, 118 first-degree relatives of patients with psychotic disorders, and 111 controls) accounts for limited ability to present significant effects in the current study and therefore the difference in findings. Further, it

should be noted that the groups under study differed. Lastly, we did not consider other protective factors or a measure of resilience in our models. Previous research proposed social support to be a potential buffer between childhood adversity and adult trauma symptoms (Evans et al., 2013; Kim et al. 2013; Murthi & Espelage, 2005). Further, positive experiences have been coined as emotional buffers for daily stressors, and reduce their negative effect and relieve symptoms (Dokuz et al., 2022). Therefore, we would suggest future research to also take into account other potential (emotional) buffers when examining the pathway of childhood adversity to psychopathology.

In conclusion, reflecting on our results in the context of the existing large body of research on self-esteem and its effect on the development and maintenance of psychopathology, we propose targeting self-esteem in an intervention to have significant potential to prevent the development and maintenance of psychopathology later in life.

SELFIE intervention (third part)

An accessible, guided self-help EMI was developed to improve self-esteem (the 'SELFIE intervention') in youth who had experienced childhood adversity. This SELFIE intervention is under study in the SELFIE trial of which the research protocol is presented in Chapter 5. The SELFIE intervention was offered through a smartphone application, over six weeks, in which intervention components were delivered in daily life. Further, it was guided by a trained SELFIE therapist, who offered an (online) meeting at the start of the first week, and every other week. In the weeks in between, the SELFIE therapist emailed the participant with some feedback and an introduction for that coming week. The SELFIE intervention focuses on strengthening positive self-esteem by creating awareness of selective attention in self-evaluation and increasing positive self-evaluation, as well as stimulating the practice of behavior fitting more positive self-esteem, rather than directly targeting negative self-esteem. The efficacy of the intervention has been analyzed. Findings show improvement in the primary outcome of self-esteem at post-intervention and 6-month follow-up, and small to moderate effect sizes point towards beneficial effects on some secondary outcomes such as general psychopathology and quality of life (Reininghaus et al. (in revision).

Besides efficacy, other variables are of importance in comparing and evaluating treatments, such as efficiency, cost-effectiveness, accessibility, and reduction in patient-reported distress (Mansell, 2019). For the SELFIE intervention, focussing on self-esteem, qualitative methods were used to add to research on determining how to intervene on and define an outcome of self-esteem that is relevant to youth receiving an intervention (e.g., measuring their reduction in reported distress). Specifically, in the form of a realist evaluation, we investigated mechanisms leading to outcomes of the SELFIE intervention related to self-esteem, and under what circumstances these mechanisms do or do

not come into play (Chapter 6). Our findings propose cognitive behavioral intervention components as mechanisms underlying the SELFIE intervention, leading to a change in cognitions (cognitive restructuring), and consequently, a change in affect was established. Participants gained practice and experience in a new skill related to the self, namely to be able to think positively of oneself, and this was experienced to be supportive of the process of cognitive restructuring. Repetition of exercising this skill was essential in leading to cognitive change, and delivering the intervention through a smartphone application and prompting reminder beeps, seem to be supportive contexts for this repetition. Further, guided self-help may be a supportive context facilitating motivation and active participation. It seemed to enhance a sense of self-direction and participants reported gaining a sense of control over change, which both may be powerful mechanisms, particularly in changing self-esteem.

As described in the introduction, EMI is rooted in a theoretical framework of ecological psychology. The SELFIE trial, as a high-quality trial, adds to enhance the field of EMI research (Colombo et al., 2019; Goldberg et al., 2022; Lecomte et al., 2020). Further, since limited theories on EMI are available to date, our process evaluation aimed to add to this gap of knowledge by investigating, within the SELFIE intervention, mechanisms of EMI (in addition to the previously described results focussing on the mechanisms of self-esteem), and under what circumstances these mechanisms do or do not come into play (Chapter 7). The results of our evaluation led to the formulation of the following refined program theories: 1) The SELFIE intervention is offered through a smartphone application enabling constant availability of the intervention and thereby increasing accessibility and feasibility, and, when offered on their personal smartphone this enhanced a sense of privacy ensuring less hesitance in engaging with the app, leading to more open and active participation; 2) Offering the intervention through the use of a smartphone application facilitates the practice of skills that are not dependent on situation-specific characteristics in daily life, supporting repeated practice in different situations, leading to the generalizability of the effect; 3) The use of a smartphone application to deliver the SELFIE intervention may encompass technical malfunction and accompanied irritation and demotivation, leading to less active or delayed participation. Furthermore, the reminder beeps are activated at random moments and with an alerting sound which can be experienced as loud and disruptive, leading to decreased motivation and less active participation, e.g. by turning off the notification or sound. Interestingly, within the SELFIE intervention, the context of accessible technical assistance was mentioned to act as a "buffer" against possible negative effects of technical malfunction.

Strengths and limitations

The findings from this dissertation make several contributions to the current literature, and the mixed methods approach can be considered a strength. It enables us to gain a

further understanding of self-esteem in the context of psychopathology and mental well-being in youth through different approaches with a wide variety of resources (e.g. help-seeking youth, cross-sectional data offered by FEP, ARMS, and controls, traumatized youth receiving the SELFIE intervention, stakeholders, and experts). In particular, the realist evaluation seems a fitted approach in aiming to understand the working mechanisms of an intervention, since a realist evaluation seeks to develop a theory on how a program works, for whom, and under what circumstances, seeking generative causation (Pawson & Tilley, 1997). Therefore, applying realist evaluation methodology within a trial investigating an EMI aids in advancing current research.

Another strength of this dissertation is the use of daily life measurements (i.e. ecological sampling method (ESM). It assists in our understanding of temporal changes and takes into consideration that self-esteem fluctuates over time (Kernis, 2005). Moreover, the feasibility, reliability, and validity of the 8-item ESM psychosis measure has been demonstrated in previous ESM research on psychotic experiences (Myin-Germeys et al., 2011; Myin-Germeys et al., 2009; Myin-Germeys et al., 2001; Palmier-Claus et al., 2012; Palmier-Claus et al., 2011; So et al., 2013; van der Steen et al., 2017). However, the scope of this dissertation was limited in terms of the number of ESM items used to study self-esteem in chapters 3 and 4. To reduce the assessment burden, a limited number of items was offered, however, this may have negatively impacted construct validity (McIver & Carmines, 1981). On a note of caution, consistent with the most prominent self-report measure of self-esteem currently in use (i.e. the Rosenberg Self-Esteem Scale (Rosenberg, 1965) and with previous research using the ESM, self-esteem was measured as a combination of positive and negative representations of self-esteem, and consequently the mean score of self-esteem consisted of only 2 items each measuring different representations of self-esteem (i.e. positive and negative). Nonetheless, in aid of our research aim and in line with previous research we chose to focus on achieving high reliability through a high number of repeated measures rather than a high number of items (Pavlickova et al., 2015; Thewissen et al., 2008; Thewissen et al., 2011; Udachina et al., 2009). In contrast, the SELFIE trial (Chapter 5) did use several primary and secondary outcome measures for self-esteem, i.e. explicit (Rosenberg Self-Esteem Scale (RSES), Self-Esteem Rating Scale (SERS), and self-scales of the Brief Core Schema Scales (BCSS)), implicit (Implicit Association Test (IAT)), and momentary (measured with the Experience Sampling Method (ESM)) self-esteem measures.

Another limitation could be coined in that the main researcher for this dissertation (MP) fulfilled several different roles throughout the research (i.e. researcher, co-developing the SELFIE intervention, and delivering the SELFIE intervention) which may have led to interpretation bias. To ensure reflexivity toward her role as a researcher, and enhance the quality criteria of neutrality, regular meetings with the research team were held. In

addition, to ensure consensus on decision-making in the research process and analysis, MP was assisted by two other researchers as a form of investigator triangulation. Moreover, consultations with researchers not directly involved in the SELFIE trial took place. By contrast, being involved in both delivering and researching the SELFIE intervention in addition to having a clinical background as a psychologist, may have supported the extent to which the findings can be conveyed or implemented in different clinically relevant settings, adhering to the quality principle of applicability of evidence (Frambach et al., 2013).

Future directions

Research

The results of this dissertation support self-esteem to be of importance for mental well-being, as well as playing a role in the development and maintenance of psychopathology. This accords with substantially accumulated evidence to show that childhood abuse (e.g. sexual abuse, physical abuse, and emotional abuse) is associated with psychotic disorders (Bendall et al. 2008; Bentall et al. 2014; Varese et al. 2012). Further, there is an abundance of research proposing self-esteem to be involved in the development or maintenance of psychosis in some way (Bentall et al., 1994; Garety et al., 2001; Kesting et al., 2013; Smith et al., 2006). Moreover, replicated evidence suggests that the link between abuse and psychosis is modified by, among others, negative schemas (Alameda et al., 2020; Gracie et al., 2007; Sideli et al., 2020). However, questions remain on when in time self-esteem exerts its effect on mental health, particularly on the pathway from childhood adversity to psychosis. Is it that self-esteem as a mechanism interacts with other constructs in identity- and personality development soon after childhood adversity is experienced, and that it does not present a direct link between childhood trauma and psychosis later in daily life? Controlling for when childhood adversity was experienced may advance theory on points in time when self-esteem exerts its effect. Additional insight may be gained by analyzing longitudinal data on different mechanisms between trauma and psychosis (e.g. immature defense mechanisms, shame, or affective disturbances and dysregulation) to establish whether the magnitude of associations between self-esteem and other relevant mechanisms differ over time pointing toward either more or less effect caused by self-esteem. Moreover, for momentary self-esteem, age should be taken into consideration when interpreting findings since different levels of stability of self-esteem occur over the life course (Baldwin & Hoffman, 2002; Meier et al., 2011; Robins & Trzesniewski, 2005) and therefore may affect the impact of self-esteem.

This dissertation has underscored the relevance of a mixed-methods approach and the relevance of applying this in EMI research. The development of EMIs should be driven more by existing knowledge and theory of the working mechanisms. We, therefore, suggest every RCT trial testing the efficacy of an EMI to perform a process evaluation of

some form to interpret the main findings of the efficacy trial as well as to build knowledge on the working mechanisms of EMIs for further development and implementation. This could provide a reciprocal strengthening of research, as when the primary outcome findings of the SELFIE randomized controlled trial are published, this dissertation may aid in understanding and interpreting certain quantitative outcomes by offering insight into participants' experiences and proposed theories on the working mechanisms. This may then offer informed decision-making on further investigations of the quantitative SELFIE trial data to test program theories.

Clinical implications

Effective interventions developed for self-esteem are available and this dissertation suggests that cognitive-behavioral components translate well to an EMI. Thus, the need is not so much to develop new intervention components addressing self-esteem, but to keep youth involved in putting interventions into practice as repetition was found to be key in reaching the desired outcome. Available knowledge regarding motivational theory should be integrated with further development of the SELFIE intervention (and EMIs in general), in a form where youth are directly involved in the further development and implementation. Preferably not merely on a consultation basis, but to strive for co-creation to achieve greater chances of matching the needs of youth. A future recommendation particularly for youth is to incorporate intervention components on evaluating the self in comparison to peers, an important aspect of self-esteem development during adolescence, aimed at decreasing the importance of this comparison. It would be of interest to hear from youth whether perhaps an online platform of some kind may support this. For example, integrated into the ENYOY platform, a moderated treatment platform for youth with beginning mental health complaints in the Netherlands (van Doorn et al., 2021).

The SELFIE intervention, if proven to be (cost-)effective, seems to be equipped for prevention and/or early intervention, since this dissertation points towards the transdiagnostic components to be best applicable to youth experiencing less severe mental disorders. This would imply offering the SELFIE intervention to youth (not yet) in aid of specialized mental healthcare, through for example @ease, an easy access service for youth (based on the Australian headspace) in the Netherlands (Leijdesdorff et al., 2022). Another important finding of clinical relevance is the supportive context of the intervention being delivered with the guidance of a SELFIE therapist. Therefore, when implementing the SELFIE intervention in the context of public mental healthcare (rather than specialized mental healthcare), the guided principle should stay intact and not be discarded due to for example costs.

Concluding remarks

The results of this dissertation indicate that help-seeking youth present high co-morbidity and fluctuations in (sub-threshold) symptoms of psychopathology across a variety of diagnoses. Self-esteem has been found to be a promising mechanism to target in a transdiagnostic intervention for youth to prevent the development of (more severe) mental disorders, based on findings of low self-esteem negatively impacting mental well-being. The experience sampling research conducted in this dissertation regarding self-esteem and psychotic experiences in daily life, adds to limited experience sampling research regarding the role of self-esteem on the pathway (from childhood adversity) to psychosis. Future research is required to extend the research on self-esteem in daily life, taking into account measures of resilience and the potential role of (emotional) mechanisms 'buffering' against the negative impact of childhood adversity on mental health. This notion of mechanisms interacting along the pathway from childhood adversity to psychosis reveals the complex nature of these pathways with multifaceted psychological and symptom-symptom interactions (Qiao et al., 2023). One clinical implication of this may be that within youth mental health, while facilitating a high rate of co-morbidity and obtaining a flexible approach to adjust interventions to the varying complexity and changing needs of this patient group, the focus should be on transdiagnostic interventions that enhance resilience rather than interventions aiming to diminish specific symptoms of mental health conditions. Our research on the SELFIE intervention may imply that transdiagnostic interventions enhancing resilience could very well be offered outside of (or adjacent to) specialized mental healthcare settings. In addition to developing interventions, future research should also investigate (preferably using a mixed methods approach) strategies to increase motivation among youth to engage in an (existing) intervention. Our findings suggest that adding guidance to self-help interventions will support motivation and engagement. Related to this, our findings stress the importance of promoting a sense of self-direction and experienced control over change within an intervention. Therefore, when implementing for example the SELFIE intervention in the context of public mental healthcare, we advise adhering to the guided principle of the intervention and not discard it in preference of cutting costs.

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Addendum

Summary

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Summary

Previous research has established adolescence as a period of high risk for the emergence of serious mental disorders, with the majority of mental disorders emerging before the age of 25. This underscores the need for prevention and early intervention in youth mental health. It is now well-established that self-esteem is assumed to potentially negatively impact mental health as well as maintain psychopathology. Thus, there is a need for interventions focusing on the crucial developmental period of 12-25 years, targeting transdiagnostic mechanisms that may impact mental health. However, it remains a challenge to offer such interventions to those who could benefit from them, since the current offering of psychological interventions does not reach youth effectively due to several barriers and has limited efficacy under real-world conditions, stressing the need for alternative approaches. This thesis set out to gain a further understanding of self-esteem in the context of psychopathology and mental well-being.

Youth mental health

Chapter 2 begins by laying out the specific characteristics of help-seeking youth between 15 and 25 years facing mental health problems, by describing both the working method of an innovative Youth Mental Health team in the Netherlands, as well as the clinical characteristics of its population. Continuity of care around the critical age of 18 was met by offering the complete treatment within the same multidisciplinary team of professionals, by offering transdiagnostic treatment to facilitate a high rate of co-morbidity characteristic of this patient-group, and by obtaining a flexible approach to adjust interventions to the varying complexity and changing needs of this patient group. Further, we found beneficial effects of the described client-centered approach. In addition, for both lower-level severity and more specialized mental healthcare, results suggest that youth mental healthcare should pay particular attention to psychosocial and environmental problems as they are closely linked to each other and call for an integrated approach to understand and treat them to prevent prolonged duration and poorer functional outcomes.

Self-esteem

The second part of this dissertation concerns research questions regarding self-esteem in the course of psychopathology. Firstly, (temporal) associations between momentary self-esteem, fluctuations in self-esteem, and psychotic experiences in daily life were examined (**Chapter 3**). Findings showed that individuals with first-episode psychosis (FEP), and individuals presenting an at-risk mental state (ARMS), experienced lower momentary self-esteem than controls. However, there was no evidence of a difference in levels of momentary self-esteem between FEP and ARMS. Further, associations between momentary self-esteem and psychotic experiences were present in FEP, ARMS, and controls. Regarding fluctuations in momentary self-esteem (coined as variability and

instability), in all groups, no significant associations with psychotic experiences were found. If we now turn to temporal associations, findings may suggest a reciprocal temporal association between self-esteem and psychotic experiences.

Secondly, we investigated whether childhood abuse (emotional abuse, physical abuse, sexual abuse, and amount of exposure to different types of abuse) modified the association between momentary self-esteem and psychotic experiences in daily life, in ARMS, FEP, and controls (**Chapter 4**). We failed to show a modifying effect of abuse on the association between momentary self-esteem and psychotic experiences. Neither did we find an effect of modification by abuse when investigating the temporal order. This is in contrast with the abundance of research suggesting childhood adversity to be linked to psychosis, and self-esteem as a mechanism on the pathway from childhood adversity to psychosis. Reflecting on this, it should be taken into account that our findings were based on measurements in daily life. Therefore, we suggest not to conclude that the absence of significant findings refutes the role of self-esteem as a mechanism between childhood abuse and psychosis per se, and propose that targeting self-esteem in an intervention has significant potential to prevent the development and maintenance of psychopathology later in life.

SELFIE intervention

In recent years, mobile health (mHealth) has increasingly developed to increase the accessibility of psychological interventions for youth. Ecological psychology assumes that experience and behavior are situated in daily life and that it is key to change behavior in daily life. With the use of mHealth, ecological momentary interventions (EMI) have been developed as smartphone applications for a range of psychopathology, enhancing the generalizability and ecological validity of the delivered interventions and can intervene in moments most needed. An accessible, guided self-help EMI was developed to improve self-esteem (the 'SELFIE intervention') in youth who had experienced childhood adversity. This SELFIE intervention is under study in the SELFIE trial of which the randomized controlled trial (RCT) research protocol is presented in **Chapter 5**. The SELFIE intervention was offered through a smartphone application, over six weeks, in which intervention components were delivered in daily life. Further, it was guided by a trained SELFIE therapist, who offered an (online) meeting at the start of the first week, and every other week. In the weeks in between, the SELFIE therapist emailed the participant with some feedback and an introduction for that coming week. The SELFIE intervention focuses on strengthening positive self-esteem by creating awareness of selective attention in self-evaluation and increasing positive self-evaluation, as well as stimulating the practice of behavior fitting more positive self-esteem, rather than directly targeting negative self-esteem. Results demonstrate efficacy on the primary outcome of self-esteem and signalled beneficial effects on for example general psychopathology and quality of life.

Besides efficacy, other variables are of importance in comparing and evaluating treatments, and a process evaluation was set out to investigate mechanisms leading to outcomes of the SELFIE intervention related to self-esteem, and under what circumstances these mechanisms do or do not come into play (**Chapter 6**). For this, we adopted the realist evaluation method. Our findings propose cognitive behavioral intervention components as mechanisms underlying the SELFIE intervention, leading to a change in cognitions (cognitive restructuring), and consequently, a change in affect was established. Participants gained practice and experience in a new skill related to the self, namely to be able to think positively of oneself, and this was experienced to be supportive of the process of cognitive restructuring. Repetition of exercising this skill was essential in leading to cognitive change, and delivering the intervention through a smartphone application and prompting reminder beeps, seem to be supportive contexts for this repetition. Further, guided self-help may be a supportive context facilitating motivation and active participation. It seemed to enhance a sense of self-direction and participants reported gaining a sense of control over change, which both may be powerful mechanisms, particularly in changing self-esteem.

As described before, EMI is rooted in a theoretical framework of ecological psychology. However, limited theories on EMI are available to date. Our process evaluation aimed to add to this gap of knowledge by investigating, within the SELFIE intervention, mechanisms of EMI (in addition to the previously described results focussing on the mechanisms of self-esteem), and under what circumstances these mechanisms do or do not come into play (**Chapter 7**). The results of our evaluation led to the formulation of the following refined program theories: 1) The SELFIE intervention is offered through a smartphone application enabling constant availability of the intervention and thereby increasing accessibility and feasibility, and, when offered on their personal smartphone this enhanced a sense of privacy ensuring less hesitance in engaging with the app, leading to more open and active participation; 2) Offering the intervention through the use of a smartphone application facilitates the practice of skills that are not dependent on situation-specific characteristics in daily life, supporting repeated practice in different situations, leading to the generalizability of the effect; 3) The use of a smartphone application to deliver the SELFIE intervention may encompass technical malfunction and accompanied irritation and demotivation, leading to less active or delayed participation. Furthermore, the reminder beeps are activated at random moments and with an alerting sound which can be experienced as loud and disruptive, leading to decreased motivation and less active participation, e.g. by turning off the notification or sound. Interestingly, within the SELFIE intervention, the context of accessible technical assistance was reported to act as a "buffer" against possible negative effects of technical malfunction.

Chapter 8 presents a general discussion of the main findings as summarized above, strengths and limitations of this dissertation, and reflects on future directions. Regarding research, we would suggest that every randomized controlled trial testing the efficacy of an EMI should perform a process evaluation of some form to interpret the main findings of the efficacy trial as well as to build knowledge on the working mechanisms of EMIs for further development and implementation. With regards to clinical implications, the SELFIE intervention, if proven to be (cost)-effective, seems to be equipped for prevention and early intervention, since this dissertation points towards the transdiagnostic components to be best applicable to youth experiencing less severe mental disorders. This would imply offering the SELFIE intervention to youth not (yet) in aid of specialized mental healthcare, through for example @ease, an easy-access service for youth (based on the Australian headspace) in the Netherlands.

Samenvatting

Eerder onderzoek heeft aangetoond dat de adolescentie een periode is met een hoog risico op het ontstaan van ernstige psychische stoornissen, waarbij de meerderheid van de psychische stoornissen vóór de leeftijd van 25 jaar ontstaat. Dit onderstreept de noodzaak van preventie en vroegtijdige interventie in de geestelijke gezondheidszorg voor jongeren. Er wordt verondersteld dat een negatief gevoel van eigenwaarde een negatieve invloed heeft op de mentale gezondheid en psychopathologie mede in stand houdt. Er bestaat dus een behoefte aan interventies die zich richten op transdiagnostische mechanismen die van invloed zijn op de mentale gezondheid, waarbij de nadruk ligt op de cruciale ontwikkelingsperiode van 12-25 jaar. Het blijkt echter een uitdaging om dergelijke interventies aan te bieden aan diegenen die er baat bij zouden kunnen hebben, aangezien het huidige aanbod van psychologische interventies de jeugd ineffectief lijkt te bereiken vanwege verschillende barrières en bovendien onvoldoende uitwerking heeft in het dagelijks leven. Dit benadrukt het belang van een alternatieve behandelwijze. Dit proefschrift heeft tot doel een beter begrip te krijgen van het gevoel van eigenwaarde in de context van psychopathologie en mentaal welzijn.

Mentale gezondheid van jongeren

Hoofdstuk 2 begint met het uiteenzetten van de specifieke kenmerken van hulpzoekende jongeren tussen de 15 en 25 jaar die met mentale gezondheidsproblemen kampen, binnen de context van een team gericht op de transitiepsychiatrie binnen een geestelijke gezondheidszorginstelling in Nederland. De werkwijze van het team wordt beschreven evenals de klinische populatie. De continuïteit van de zorg rond de kritieke leeftijd van 18 jaar werd bereikt door het aanbieden van een volledige behandeling binnen hetzelfde multidisciplinaire team van professionals, door het aanbieden van een transdiagnostische behandeling en daarmee aan te sluiten bij het hoge percentage van comorbiditeit dat kenmerkend is voor deze doelgroep, en door een flexibele aanpak om interventies aan te passen aan de variërende complexiteit en veranderende behoeften van deze doelgroep. Verder vonden we gunstige effecten van de beschreven cliëntgerichte aanpak. Bovendien onderstrepen de resultaten het belang van het besteden van aandacht aan psychosociale problemen en omgevingsfactoren, aangezien deze nauw met elkaar samenhangen en vragen om een geïntegreerde aanpak.

Zelfbeeld

Het tweede deel van dit proefschrift behandelt onderzoeksvragen met betrekking tot het zelfbeeld in relatie tot psychopathologie. Ten eerste werden (temporele) associaties tussen zelfbeeld, schommelingen in het zelfbeeld en psychotische ervaringen in het dagelijks leven onderzocht (**hoofdstuk 3**). Uit onze resultaten bleek dat personen met een eerste episode van psychose (in de Engelse literatuur benoemd als ‘first episode psychosis’, FEP)

en personen met een verhoogd risico op psychische klachten (in Engelstalige literatuur 'at-risk mental state', ARMS, genoemd), een negatiever zelfbeeld rapporteerden dan personen uit de controlegroep. Verder werden er associaties gevonden tussen zelfbeeld en psychotische ervaringen, in alle drie de groepen. Met betrekking tot temporele associaties, lijken de resultaten te wijzen op een wederkerig verband tussen zelfbeeld en psychotische ervaringen. Ten tweede onderzochten we of (vroeg)kinderlijk misbruik (emotioneel misbruik, fysiek misbruik, seksueel misbruik en de mate van blootstelling aan verschillende van deze soorten misbruik) de associatie tussen zelfbeeld en psychotische ervaringen in het dagelijks leven veranderde, in ARMS, FEP en controlegroep (**hoofdstuk 4**). Hier hebben we geen bewijs voor gevonden, ook niet wanneer temporele associaties werden onderzocht. Dit staat in contrast met de overvloed aan onderzoeksbevindingen die suggereren dat vroegkinderlijk trauma verband houdt met psychose, en dat zelfbeeld een rol speelt op dit pad van vroegkinderlijk trauma naar psychose. We dienen er echter rekening mee te houden dat onze bevindingen zijn gebaseerd op metingen in het dagelijks leven. Gezien de overtuiging van onderzoeksbevindingen aangaande vroegkinderlijk trauma, zelfbeeld en psychose, wijzen wij de rol van zelfbeeld in het tot stand komen van psychotische klachten niet af op basis van onze eigen bevindingen, en onderstrepen we de waarde van een interventie die zich richt op zelfbeeld in het tegengaan van de ontwikkeling of instandhouding van psychopathologie op latere leeftijd.

De SELFIE-interventie

De afgelopen jaren zijn digitale interventies in toenemende mate ontwikkeld om de toegankelijkheid van psychologische interventies voor jongeren te vergroten. Het gedachtegoed van de ecologische psychologie kenmerkt zich door ervan uit te gaan dat ervaring en gedrag zich bevinden in het dagelijks leven waar het gemeten en ook beïnvloedt dient te worden. Dagelijks leven interventies (in dit proefschrift wordt verwezen naar de Engelse term 'ecological momentary intervention' (EMI)) zijn in de afgelopen jaren dan ook veelvuldig ontwikkeld als smartphone-applicaties voor een veelvoud aan psychopathologie. Het verhoogt de generaliseerbaarheid van de interventies, de ecologische validiteit neemt toe en de interventie kan ingrijpen op momenten dat het het meest noodzakelijk is. In het kader van een groot onderzoek (SELFIE) werd een dagelijks leven interventie ontwikkeld in de vorm van begeleide zelfhulp om het zelfbeeld te verbeteren bij jongeren die vroegkinderlijk trauma hadden ervaren (de 'SELFIE-interventie'). Deze SELFIE-interventie wordt onderzocht in een gerandomiseerde gecontroleerde studie (SELFIE-studie) waarvan het onderzoeksprotocol wordt gepresenteerd in **Hoofdstuk 5**. De SELFIE-interventie werd gedurende zes weken aangeboden via een smartphone-applicatie, waarin interventiecomponenten in het dagelijks leven werden aangeboden. Verder werd de interventie begeleid door een getrainde SELFIE-therapeut, die aan het begin van de eerste week, en om de week, een (online) bijeenkomst aanbood. In de tussenliggende weken e-mailde de SELFIE-therapeut de deelnemer met wat feedback en een introductie voor de komende week.

In plaats van zich direct te richten op het negatieve zelfbeeld, richt de SELFIE-interventie zich op het versterken van het positieve zelfbeeld door het proces van selectieve aandacht te doorbreken en zich te richten op positieve zelfevaluatie en het stimuleren van gedrag dat beter past bij een meer positief zelfbeeld. Resultaten tonen effectiviteit aan op de primaire uitkomstmaat van zelfbeeld en met voorzichtigheid wordt gewezen op gunstige effecten op bijvoorbeeld algemene psychopathologie en kwaliteit van leven.

Naast het meten van effectiviteit, zijn ook andere variabelen van belang met betrekking tot het vergelijken en evalueren van behandelingen. Er is een evaluatieonderzoek opgezet (gebruik makend van de 'realist evaluation' methode) om mechanismen te onderzoeken die leiden tot de verwachte resultaten van de SELFIE-interventie op het gebied van zelfbeeld, en onder welke omstandigheden deze mechanismen wel of niet een rol spelen (**Hoofdstuk 6**). Onze bevindingen wijzen erop dat componenten van cognitieve gedragstherapie ten grondslag liggen aan de SELFIE-interventie, die leiden tot een verandering in cognities (cognitieve herstructurering), en bijgevolg een verandering in affect. De deelnemers gaven aan dat ze de interventie hebben ervaren als het leren van een nieuwe vaardigheid, namelijk het positief over zichzelf kunnen denken. Herhaling van het oefenen van deze vaardigheid was essentieel om tot cognitieve verandering te leiden, en het uitvoeren van de interventie via een smartphone-applicatie ondersteund met herinneringspiepjes lijkt een ondersteunende context voor het herhalen van de vaardigheid. Het aanbieden van de interventie in de vorm van begeleide zelfhulp lijkt ondersteunend door het bieden van motivatie en het bevorderen van een actieve deelname. Deze interventie vorm leek een gevoel van zelf oprichtend vermogen te vergroten en deelnemers meldden dat ze een gevoel van controle over verandering ervoeren. Dit lijken beide krachtige mechanismen te zijn voor een interventie, vooral met betrekking tot zelfbeeld.

Zoals eerder beschreven is EMI geworteld in een theoretisch kader van de ecologische psychologie. Echter zijn er tot op heden in beperkte mate theorieën over EMI beschikbaar. Ons evaluatieonderzoek had tot doel deze kenniskloof te verkleinen door, binnen de SELFIE -interventie, mechanismen van EMI te onderzoeken (naast de eerder beschreven resultaten die zich richtten op de mechanismen van zelfbeeld), en onder welke omstandigheden deze mechanismen wel of niet in werking treden (**Hoofdstuk 7**). De resultaten van onze evaluatie hebben geleid tot het formuleren van de volgende programmatheorieën: 1) De SELFIE-interventie wordt aangeboden middels een smartphone-applicatie die constante beschikbaarheid van de interventie mogelijk maakt en daardoor de toegankelijkheid en haalbaarheid vergroot. En, wanneer aangeboden op hun eigen smartphone, dit een gevoel van privacy bood en aarzeling bij het gebruik van de app verminderde, wat leidt tot een meer open houding en actieve deelname; 2) Het aanbieden van de interventie middels een smartphone-applicatie vergemakkelijkt het oefenen van vaardigheden die niet afhankelijk zijn van situatie specifieke aspecten in het dagelijks leven, waardoor herhaaldelijk

oefenen in verschillende situaties wordt ondersteund, leidend tot generaliseerbaarheid van het effect; 3) Het gebruik van een smartphone-applicatie om de SELFIE-interventie uit te voeren kan een technische storing en daarmee gepaard gaande irritatie en demotivatie met zich meebrengen, wat leidt tot minder actieve of vertraagde deelname. Bovendien worden de herinneringspiepjes op willekeurige momenten afgespeeld met een geluid dat als luid en/of storend zou kunnen worden ervaren, wat leidt tot verminderde motivatie en minder actieve deelname en daarmee het uitschakelen van de meldingen of het geluid. Interessant is dat binnen de SELFIE-interventie bleek dat de context van een toegankelijke technische assistentie als een “buffer” fungeerde tegen mogelijke negatieve effecten van technische storingen.

Hoofdstuk 8 presenteert een algemene discussie van de belangrijkste bevindingen zoals hierboven samengevat, de sterke en zwakke punten van dit proefschrift, en beschrijft aanbevelingen met betrekking tot toekomstig onderzoek en klinische implicaties. Wat onderzoek betreft, zouden we willen voorstellen dat elke RCT dat de werkzaamheid van een EMI onderzoekt een evaluatieonderzoek van enige vorm zou moeten uitvoeren om de belangrijkste bevindingen te interpreteren en om kennis op te bouwen over de werkingsmechanismen van EMIs voor verdere ontwikkeling en implementatie. Met betrekking tot de klinische implicaties lijkt de SELFIE-interventie, indien (kosten-)effectiviteit bewezen wordt, toegerust voor preventie en/of vroegtijdige interventie. De resultaten van dit proefschrift wijzen er namelijk op dat de transdiagnostische componenten het best toepasbaar zijn op jongeren die minder ernstige psychische problemen ervaren. Dit zou betekenen dat de SELFIE-interventie wordt aangeboden aan jongeren die (nog) niet in behandeling zijn binnen de specialistische geestelijke gezondheidszorg via bijvoorbeeld @ease (gebaseerd op de Australische headspace), een laagdrempelige en toegankelijke inloopvoorziening voor jongeren in Nederland.

Impact paragraph

This dissertation aimed to investigate the transdiagnostic concept of self-esteem in the course of psychopathology and act upon a need for interventions targeting transdiagnostic mechanisms focusing on the crucial developmental period of 12-25 years.

Main findings and conclusions

The results of this dissertation indicate that help-seeking youth present high co-morbidity and fluctuations in (sub-threshold) symptoms of psychopathology across a variety of mental health conditions. Based on findings regarding the negative impact of low self-esteem on mental well-being, self-esteem is a promising mechanism to target in a transdiagnostic intervention for youth to prevent the development of (more severe) mental disorders. Further, there is an abundance of research proposing self-esteem to play a modifying role between childhood adversity and psychosis. Thus, we concluded that targeting self-esteem in an intervention has significant potential to prevent the development and maintenance of psychopathology later in life. The SELFIE trial aimed to test the efficacy of such an intervention by targeting self-esteem in youth who had experienced childhood adversity. The findings of our process evaluation suggest that the SELFIE intervention was experienced as being a low threshold and easily accessible ecological momentary intervention (EMI) by its users. Further, the working mechanisms of the SELFIE interventions have been coined, in short, as exercises leading to cognitive restructuring and subsequently positive affect.

Scientific impact

As described in this dissertation, adolescence is seen as a period of high risk for the emergence of serious mental disorders, with the majority of mental disorders emerging before the age of 25. This underscores the need for early prevention as well as early intervention in youth mental health. This dissertation contributes to research in this field by examining the transdiagnostic mechanism of self-esteem in relation to psychopathology. There is limited experience sampling research regarding self-esteem as a putative mechanism on the pathway (from childhood adversity) to psychosis and this dissertation adds to the existing knowledge by researching self-esteem and psychotic experiences in daily life (Chapters 3 and 4).

Additionally, this dissertation adds to research on EMI. Firstly in the form of the SELFIE trial, as a high-quality trial (Chapter 5). Secondly, since limited theories on EMI are available to date, our process evaluation aimed to add to this gap of knowledge by investigating, within the SELFIE intervention, mechanisms of EMI, and under what circumstances these mechanisms do or do not come into play. Moreover, reflecting on the methodological

aspects of this dissertation, we conclude that conducting mixed methods in EMI research will enhance this field and fill gaps in the current literature (Chapters 6 and 7).

Clinical relevance

This dissertation previously stated that there is a gap between those in need of mental health interventions and those who actually receive care. Chapter 2 describes the working method of an innovative Youth Mental Health team in the Netherlands, thereby strengthening available knowledge on this specifically relevant population, and proposing clinical implications to improve youth mental healthcare to meet the needs of those in need of care. In line with previous findings, the population of this youth mental health team showed high rates of co-morbidity, and the results argue for obtaining a flexible approach to adjust interventions to the varying complexity and changing needs of this patient group.

The knowledge obtained in this dissertation does not only apply to specialized mental healthcare. The SELFIE intervention, if proven (cost-)effective, seems to be equipped for prevention and/or early intervention, since this dissertation points towards the trans-diagnostic components to be best applicable to youth experiencing less severe mental disorders. This would imply offering the SELFIE intervention to youth (not yet) in aid of specialized mental healthcare, through for example @ease, an easy-access service for youth (based on the Australian headspace) in the Netherlands. The aforementioned findings are highly relevant in the prevention of mental disorders and the effective timing of interventions. Further, an important finding of clinical relevance is the supportive context of the intervention delivered as guided by a SELFIE therapist. Therefore, when implementing the SELFIE intervention in the context of public mental healthcare (rather than specialized mental healthcare), the guided principle should stay intact and not be discarded due to for example costs. It could be inferred that this does not solely apply to the SELFIE intervention, however, this remains to be examined in different types of EMIs in future research. These findings may guide the implementation of alternative interventions effectively in the coming years, enhancing efficiency and cost-effectiveness in reforming youth mental healthcare.

Target group

Due to its scientific impact, it seems reasonable to argue that the findings of this dissertation are relevant to researchers, both in the field of early intervention and transdiagnostic mechanisms, as well as in the field of developing and implementing EMIs. The clinical implications are in themselves relevant for clinicians and patients in proposing clinical directions and further, by presenting intervention components and their mechanisms, potentially enhancing one's therapeutic reasoning. In addition, individuals seeking ways to improve their mental health might also take interest in the results since these underscore

the role of self-esteem in mental well-being in general. Lastly, policymakers on (youth) mental healthcare may find relevance in the results providing insights applicable to choices regarding content, timing, and mode of delivery of mental healthcare interventions.

Dissemination of knowledge

The findings of this dissertation have been presented and shared nationally during for example the Dutch annual conference of Transition Psychiatry (Jaarcongres Transitiepsychiatrie). Concerning the training of clinical psychiatrists, the presented results have informed the publication of a module on transitional psychiatry (AccreDidact). As far as the SELFIE study is concerned, participants, the SELFIE therapists, and the involved mental health centers were and continue to be updated by annual newsletters and social media updates. In addition, a Dutch actress in a youth television series was attracted as an ambassador for the SELFIE study. In that role, she recorded several podcasts on mental health and the SELFIE study and disseminated our research updates to her 27,5k social media followers. Items on the SELFIE study have been published on paper in local freely available magazines, such as 'Hecht' (a magazine from the MUMC+ that is delivered to all home addresses in South Limburg), 'Observant' (an independent university magazine of Maastricht University), and orally presented at collaborating mental health care institutions such as at a research symposium at Mondriaan.

Presentations at several international scientific conferences (such as the International Conference on Early Intervention in Mental Health (IEPA) in 2023, Lausanne, European Society of Child & Adolescent Psychiatry (ESCAP) meetings in 2019 (Vienna) and 2022 (Maastricht), the DGPPN Kongress in Berlin in 2019, or the International Association of Youth Mental Health (IAYMH) conferences in 2019 (Brisbane) and 2022 (Copenhagen) facilitate dissemination of the research findings internationally and open up potential future collaborations.

Curriculum vitae

Mary Rose Postma was born on August 24, 1984, in Nijkerk, the Netherlands. After finishing a Bachelor's and Master's degree in Psychology at the University of Utrecht, she started a pre-master in Cultural Anthropology and subsequently a Master's degree in Cultural Anthropology, both at the University of Utrecht. After graduation, she started clinical work in 2010 as a psychologist at HSK Group in Maastricht, in adult psychiatry. In 2013, she obtained a post-master degree and the registration 'gezondheidszorgpsycholoog'. In 2015, she took an interest in transitional psychiatry and started her work in this field at Virenze. Alongside her clinical work there, Mary Rose was involved in starting up the first @ease centres in the Netherlands (Maastricht and Amsterdam) and was responsible for setting up and delivering the training for volunteers within @ease. In 2018, Mary Rose joined the SELFIE research team at Maastricht University as a part-time PhD student, under the supervision of Prof. dr. Thérèse van Amelsvoort and Prof. dr. Ulrich Reininghaus. In parallel, she worked as a psychologist at a transitional psychiatry team within Mondriaan, becoming a scientist-practitioner. Currently, Mary Rose is in her first year of the 4-year clinical post-master training program for 'klinisch psycholoog', working at PsyQ Heerlen.

Dankwoord

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