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Reflective functioning in an adolescent community sample

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ABSTRACT

The Reflective Functioning Scale (RFS) is a widely used psychodynamic measure that has been thoroughly studied in adult samples. However, to date empirical data regarding reflective functioning (RF) in adolescence has been sparse. The present study examines RF in a German sample of 96 adolescent pupils (aged 15–18). The study assesses the RF capacities of the adolescent pupils and examines its association to intelligence, language skills, sociodemographic data, and psychological adaptation. As expected theoretically, the mean RF score of the adolescent sample was significantly lower than that of adult community samples. Furthermore, sex, migration background and language skills were significantly related to RF. High RF capacities were associated with lower levels of externalizing symptoms especially in adolescents with psychopathy, however RF was unrelated to internalizing symptoms. The results of the study give further evidence for the importance of examining RF in adolescent individuals. The possible importance of RF as a protective factor in dealing with adversities should be considered in psychotherapy and prevention programs.

1. Introduction

During the last decades, the concept of mentalization has become very popular in psychodynamic theory and research. While the concept is well studied in adult samples, research on children and adolescents is still sparse. The present study assesses the mentalization capacities of adolescent pupils and examines its association to intelligence, language skills, sociodemographic data and psychological adaptation.

1.1. Attachment and the concept of mentalization

Mentalization is defined as the capacity to interpret one's own behavior and the behavior of others in terms of intentional mental states like feelings, beliefs, or desires (Fonagy, Gergely, Jurist, & Target, 2002). People's behavior then becomes meaningful and one is able to interpret and predict interpersonal behavior, which is an important precondition for social competence and for self-regulation capacities. According to Fonagy, Steele, Steele, Higgitt, and Target (1994), mentalizing is critical for achieving autonomy and developing a coherent sense of identity.

Mentalization capacities develop mainly during the first five years of life and are thought to depend on the quality of early parent-child-interactions (Fonagy et al., 2002). Antecedents of the capacity to mentalize, such as self-awareness, are mainly affected by a marked and contingent mirroring by the child's caregivers (cf. Gergely & Watson, 1996). Consequently, insecure attachment patterns and/or childhood abuse and neglect are thought to hinder the development of mentalization abilities (Fonagy et al., 2002).

In the theory of mentalization, Fonagy and colleagues connect Theory-of-Mind (ToM) research and attachment theory with psychoanalytic theory and developmental psychology. Due to its complexity, the construct overlaps with several related psychological concepts, e.g. mindfulness, psychological mindedness, empathy or affect consciousness (see Choi-Kain & Gunderson, 2008).

1.2. Reflective Functioning (RF) and the Reflective Functioning Scale (RFS)

Mentalization as such is an abstract concept and therefore requires operationalization. One well established operationalization is Reflective Functioning (RF) as introduced by Fonagy, Target, Steele, and Steele (1998). RF is the ability to attribute mental states to oneself and others in an attachment related context. While ToM tasks only assesses the cognitive ability to attribute mental states to oneself and others, RF measures this ability under social-emotionally challenging circumstances.

RF can be assessed by analyzing interview narratives about

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important attachment relationships. The Reflective Functioning Scale (RFS: Fonagy et al., 1998) is the standard instrument for that purpose. It is a manual providing rating categories to be applied to the interviewee's responses from the Adult Attachment Interview (AAI: George, Kaplan, & Main, 1996; see below). An RFS coding follows two steps: (1) It identifies passages in the narrative that demonstrate RF, i.e., responses indicating the use of mental state understanding; (2) These passages are rated with respect to the extent of how elaborated the RF capacities are (see section 2.2 for further details).

For the assessment of RF in adolescents an adaptation of the RFS has been developed recently (RFS – Adolescent: Chow, Shmueli-Goetz, & Fearon, 2014; Chow, Nolte, Cohen, Fearon, & Shmueli-Goetz, 2017). The ratings of this scale are based on the Child Attachment Interview (CAI: Shmueli-Goetz, Target, Fonagy, & Datta, 2008), a developmentally appropriate interview protocol to ask children and adolescents about their attachment relationships. A study using the RFS – Adolescent in a non-clinical adolescent sample resulted in slightly higher RF scores than studies using the adult version of the RFS (Chow et al., 2017), which may indicate that the ratings of the RFS – Adolescent are more age-appropriate. However, further studies are needed to make a final conclusion.

1.3. Empirical evidence on reflective functioning

Compared to non-clinical samples, RF was significantly lower in several adult patient groups (see Katznelson, 2014). Borderline Personality Disorder (BPD) in particular seems to be linked to RF deficits (Fischer-Kern et al., 2010; Fonagy et al., 1996; Ha, Sharp, Ensink, Fonagy, & Cirino, 2013; Levy et al., 2006) and RF deficits have been found to be linked to personality malfunctioning (Antonsen, Johansen, Ro, Kvarstein, & Wilberg, 2016; Bouchard et al., 2008; Fischer-Kern et al., 2010; Mueller, Kaufhold, Overbeck, & Grabhorn, 2006). Studies also found insecure attachment to be correlated with RF deficits (Bouchard et al., 2008; Fonagy & Target, 1997). Furthermore, lower RF scores were correlated with a history of childhood trauma (Dauphin, Lecomte, Bouchard, Cyr, & David, 2013; Ensink, Bégin, Normandin, & Fonagy, 2016) and with aggressive behavior and psychopathy (Taubner, White, Zimmermann, Fonagy, & Nolte, 2013b).

Additionally to considering low RF as a developmental deficit, we may regard high RF as a protective factor. Some authors even speculate that RF may be more important in the context of coping with adversities than for normal development (Falkenström et al., 2014). For example, individuals with a history of abuse were less likely to develop a BPD in the case of high RF (Fonagy et al., 1996), and children of mothers with insecure attachment patterns were more likely to be securely attached if their mothers had high RF capacities (Diamond, Stovall-McClough, Clarkin, & Levy, 2003; Fonagy et al., 1994; Slade, Grienenberger, Bernbach, Levy, & Locker, 2005). In a study of Borelli et al. (2018b), higher RF in children was associated with a more efficient stress regulation when confronted with attachment stress.

Compared to RF research in adults, research in children and adolescents is sparse. However, some authors state that RF can play a significant role in handling the developmental challenges of adolescence successfully (Benbassat & Priel, 2012; Fonagy et al., 2002; Rosso, Viterbori, & Scopesi, 2015; Taubner & Curth, 2013).

Benbassat and Priel (2012) found parental RF associated with adolescents' RF and social competence. In this study, parental RF also moderated the relationship between parenting behavior and adolescent adjustment (Benbassat & Priel, 2012). Additionally, Borelli et al. (2018a) showed in a longitudinal study that RF scores in adolescence were a significant predictor of greater well-being in early adulthood.

Rosso et al. (2015) presume that especially during adolescence impaired mentalization of either the parent or the child may promote family conflict, behavior disorders and psychopathology. Fonagy et al. (2002) suggest as well that the increase of psychopathology during adolescence may be linked to mentalization deficits. Especially externalizing disorders are thought to be associated with mentalizing difficulties (Fonagy & Luyten, 2018; Sharp & Venta, 2012). Bleiberg (2013) assumes that even a tumultuous but not pathologic adolescence can be accompanied by an adaptive breakdown due to disruptions in mentalizing. According to the author the distressing and manipulating behavior of the adolescent may then in turn evoke intense feelings of helplessness or anger in the parents and disrupt their mentalizing, too. This can result in a vicious cycle of non-mentalizing in the family, which hinders an adequate parental emotional support for the adolescent child (Bleiberg, 2013).

Several authors suggest that the development of mentalization abilities does not terminate in adolescence but continues to improve through young adulthood, which may be explained by the course of brain development (Dumontheil, Apperly, & Blakemore, 2010; Fonagy & Luyten, 2009; Keulers, Evers, Stiers, & Jolles, 2010; Sebastian, Burnett, & Blakemore, 2008). This conjecture was supported by some studies (Borelli et al., 2018a; Borelli, Compare, Snavely, & Decio, 2015; Taubner et al., 2013b) finding the mean overall RF score lower in adolescent samples compared to adult samples[1]. However, RF scores were not correlated with age within adolescent samples (Chow et al., 2017; Taubner et al., 2013b).

Borelli et al. (2015) found in an adolescent sample parental neglect to be correlated with insecure attachment only when RF was low or moderate but not in cases of high RF. Taubner and Curth (2013) showed for adolescents that the correlation between childhood maltreatment and aggressive behavior was no longer significant when RF was added as a mediating variable. Similarly, Ensink et al. (2016) reported that RF partially mediated the relationship between child sexual abuse and depressive symptoms as well as between child sexual abuse and externalizing behavior in a sample of children aged 7–12 years. Taubner et al. (2013b) found RF to moderate the relationship between psychopathic traits and proactive aggression. Psychopathic traits of adolescents were correlated with aggressive behavior in the case of low or moderate RF but not in the case of high RF. However, in a recent study of Chow et al. (2017) RF neither mediated nor moderated the relationship between psychopathic traits and externalizing symptoms. Moreover, these authors found a significant positive correlation between RF and internalizing symptoms but no significant correlation between RF and externalizing symptoms.

Apart from these results, research on RF in adolescence is still insufficient. Therefore, the present study investigates RF in a sample of adolescent pupils.

1.4. Research questions

[1] First, the current study examines the distribution of RF scores in the adolescent sample and compares this distribution with the respective distributions in adult samples. Based on our theoretical assumptions as well as on previous results from adolescent samples, we expect lower adolescents' RF scores compared to those of adult samples. [2] Second, we examine correlations between RF and cognitive abilities (general intelligence, language skills) sociodemographic data (sex, age), childhood trauma, attachment, psychopathy and psychological adaptation (internalizing and externalizing symptoms). While we do not expect RF to be linked to general intelligence, we do expect substantial correlations between RF and language skills. This expectation relies on studies finding strong correlations of children's and adolescents'

[1] As already noted above, a study with adolescents using the RFS – Adolescent (Chow et al., 2014; Chow et al., 2017) resulted in slightly higher RF scores ($M = 5.35$, $SD = 1.05$). However, since this scale was not yet developed when data were collected, the adult version of the RFS was used to assess RF in the current study. Consequently, we expect similar results than previous studies using the adult version of the RFS in adolescent samples.

language skills on the one hand and several measures of their mentalization or ToM capacities on the other (Astington & Jenkins, 1999; Cutting & Dunn, 1999; Peterson & Miller, 2012; Rutherford et al., 2012). We expect further that girls have higher RF scores than boys, as has been found in other studies (Baron-Cohen & Wheelwright, 2004; Caroll & Chiew, 2006; Chow et al., 2017; Rutherford et al., 2012; Walker, 2005). In line with studies with adolescents (Chow et al., 2017; Taubner et al., 2013b) we do not expect substantial correlations between RF and age. However, based on several study results we expect lower RF scores in the case of insecure attachment patterns (Bouchard et al., 2008; Fonagy & Target, 1997) and in the case of childhood trauma (Dauphin et al., 2013; Ensink et al., 2016). RF has so far been studied in Western Countries thus ignoring possible cultural effects. Van Ijzendoorn and Kroonenberg (1988) have shown that the cultural background has an influence upon attachment patterns, hence it is likely relevant for RF as well. Therefore, the present study takes into account pupils' migration background serving as a proxy variable to cultural background. According to psychoanalytic theories on the experience of immigration (e.g. Ainslie, Tummala-Narra, Harlem, Barbanel, & Ruth, 2013) we assume that the development of RF is impaired in adolescents with a migration background due to several reasons: In the first generation, the experience of dislocation implies a loss of contextual continuity and necessitates changes in self-structure which may negatively affect the capacity to mentalize. Furthermore, it may be more difficult for immigrants to express emotional states in a non-mother tongue. Regarding the second generation, Ainslie et al. (2013) state that immigrated parents are often unable to provide sufficient emotional support for their children in dealing with cultural conflicts and thus cannot support them adequately in developing a coherent sense of identity. This may also affect the development of RF. Our examination of this issue is exploratory, however, because to our knowledge the impact of migration background upon RF has not been studied yet. [3] Finally, we examine the influence of RF on psychological adaptation by analyzing the relationship between RF, psychopathy and internalizing as well as externalizing symptoms. Like in previous studies (Chow et al., 2017; Colins, Andershed, Salekin, & Fanti, 2018; Fanti, Kyranides, Lordos, Colins, & Andershed, 2018; Svensson et al., 2018; Taubner et al., 2013b), we expect that adolescents with a high level of psychopathy will report more externalizing symptoms. Regarding the relationship of RF and psychological adaptation, the existing study results are heterogeneous: Several studies with adult and adolescent samples reported a significant negative correlation of RF and symptom severity (Duval, Ensink, Normandin, Sharp, & Fonagy, 2018; Ha et al., 2013; Katznelson, 2014; Rothschild-Yakar, Levy-Shiff, Fridman-Balaban, Gur, & Stein, 2010; Taubner et al., 2013b). In contrast, a recent study with $N = 95$ adolescents (Chow et al., 2017) found a correlation of $r = 0.28$ (significant) between RF and internalizing symptoms and $r = 0.11$ (not significant) between RF and externalizing symptoms. The interaction effect between RF and psychopathy differed between studies, too.

2. Material and methods

2.1. Sampling and sample characteristics

Adolescents attending four comprehensive schools in Kassel (Germany) were informed about the study and they and their parents were asked to provide written consent. Inclusion criterion was an age between 15 and 18 years. Adolescents with acute substance abuse disorders, psychotic disorders and an IQ < 80 (CFT-20: Weiß, 1998) were excluded. On completion of all tests, the adolescents received a monetary reward for their participation in the study. All tests and interviews took place at the University of Kassel. The study was approved by the Ethics Committee of the University of Kassel.

Table 1 lists the sample characteristics of the 96 participants. The mean age was 16.0 years (range 15–18) and approximately half of the sample was female (47.9%). Psychopathology was low, the participants fulfilled on average the diagnostic criteria for 0.3 Axis-I disorders and 0.3 Axis-II disorders. The most prominent diagnoses were non-acute substance abuse ($n = 8$) and depressive disorders ($n = 6$) on Axis I and borderline personality disorder ($n = 5$) and antisocial personality disorder ($n = 5$) on Axis II. Moreover, 7 adolescents fulfilled the diagnostic criteria for conduct disorders during childhood and adolescence, 10.4% of the sample reported self-harming behavior and 18.8% reported a history of childhood trauma (sexual abuse, physical maltreatment) in the Childhood Experience of Care and Abuse Questionnaire (CECA-Q: Bifulco, Bernazzani, Moran, & Jacobs, 2005). Only 9.4% of the sample reported psychotherapeutic or psychiatric treatment prior to participation in the study. The average IQ (CFT-20) was 107.4 (range 84–142). The WST score (as a measure of German language skills) was slightly lower ($M = 89.0$, range 73–107). Notably, 46.9% of the adolescents reported a migration background (i.e., at least one parent was not born in Germany) and 12.5% were immigrants. Definitions of status are in accordance with the German Federal Statistical Office. The distribution of the adolescents' attachment styles differed from that of previous studies with non-clinical adult samples in which more than 50% were rated as securely attached (see van IJzendoorn, 1995; van IJzendoorn & Bakermans-Kranenburg, 1996). In the current sample this is only true for 27%. However, Aikins, Howes, and Hamilton (2009) reported comparable rates of secure attachment in a low-risk adolescent sample.

Table 1
Sample characteristics (N = 96).

Age, *M* (range)	16.0 (15-18)
Females,%	47.9
Migration background,%	46.9
Immigrants,%	12.5
Psychotherapeutic/psychiatric treatment (lt),%	9.4
Number of SCID-I diagnoses, *M (SD), n* = 79	0.3 (0.6)
Number of SCID-II diagnoses, *M (SD), n* = 79	0.3 (0.7)
Self-harming behavior,%	10.4
History of childhood trauma (CECA-Q),%	18.8
Attachment style (AAP), *n* = 81:	
Autonomous,%	27.2
Dismissing,%	29.6
Preoccupied,%	25.9
Unresolved loss or trauma,%	17.3
IQ (CFT-20), *M* (range)	107.4 (84-142)
Verbal IQ (WST), *M* (range)	89.0 (73-107)
Reflective functioning (RFS), *M (SD)*	4.0 (1.4)
PPI-R total score, *M (SD)*	344.1 (31.3)
YSR externalizing symptoms[a], *M (SD)*	14.8 (8.5)
YSR internalizing symptoms[a], *M (SD)*	11.8 (8.6)

Note. SCID-I/II = Structured Clinical Interview for DSM-IV, Axis I/II; CECA-Q = Childhood Experience of Care and Abuse Questionnaire; AAP = Adult Attachment Projective; CFT-20 = Culture Fair Intelligence Test; WST = German Vocabulary Test; RFS = Reflective Functioning Scale; PPI-*R* = Psychopathic Personality Inventory – Revised; YSR = Youth Self Report.

[a] We report the non-transformed scores here to ease the interpretation. In the following analyses, this variable was square-root transformed.

2.2. Measures

Adult Attachment Interview (AAI). The AAI (George et al., 1996) is a semistructured interview asking for attachment-related autobiographical memories, which should be evaluated from the interviewee's current perspective. It comprises 20 guiding questions targeting various aspects of the respondent's childhood and experienced difficulties during that time. The AAI can be applied for adulthood as well as for adolescence, since the distribution of AAI attachment classifications in samples of both age cohorts seem to be comparable (van IJzendoorn & Bakermans-Kranenburg, 1996).

Reflective Functioning Scale (RFS). The RFS (Fonagy et al., 1998) is a manual allowing for an efficient rating of an individual's RF capacities by scoring narratives obtained with the AAI on an 11-point scale (–1 to 9). The coding system uses four classes of qualitative descriptors of RF: (1) awareness of the nature of mental states, (2) explicit effort to tease out mental states underlying behavior, (3) recognition of developmental aspects of mental states and (4) mental states in relation to the interviewer. A score below 4 indicates negative or low RF and a score above 4 average to high RF (Fonagy et al., 1998). In non-clinical adult samples, the mean RF score was mostly around 5, which amounts to an average RF (e.g. Chiesa & Fonagy, 2014; Fonagy et al., 1996, 1998). Of the 18 questions of the AAI, 8 are regarded as demand questions explicitly prompting RF (e.g., "Why do you think your parents behaved as they did during your childhood?") whereas 10 permit questions do not explicitly ask for the demonstration of RF capacities (e.g., "Could you describe your first separation from your parents?"). Demand questions must be rated; permit questions are rated only if the answer shows an RF score of 4 or more. Taubner et al. (2013a) found with confirmatory factor analysis that RF as measured by the RFS is a unidimensional construct and that the average scores of all demand questions contributed equally to the global score. However, the analysis also revealed that the permit questions increase the explained variance compared to only using the demand questions and should therefore be taken into account as well (Taubner et al., 2013a). Interrater reliability of the RFS overall score was good in several studies (*ICC* = 0.71–.97: Borelli et al., 2015; Levy et al., 2006; Taubner et al., 2013a). However, interrater reliability was considerably lower for the ratings on single items (*ICC* = 0.27–.45: Taubner et al., 2013a). In the current study, two trained coders conducted the RFS ratings. Interrater reliability was high in a subsample of 10 cases (*ICC* = 0.90). The internal consistency of the demand questions was $\alpha = 0.89$, although this could only be calculated for 50 cases completing all demand questions.

Adult Attachment Projective (AAP). The AAP (George, West, & Pettem, 1997) was used to assess the attachment patterns of the adolescent pupils. The AAP is an attachment classification system that is based on the analysis of individuals' responses to seven attachment-related drawings. The AAP classification system uses evaluations of three dimensions (discourse, content and defensive processing) to designate the four major adult classification groups that also result from AAI ratings: secure, dismissing, preoccupied, and unresolved. Compared to the AAI, the AAP is easier to apply and less time-consuming. The results of several validation studies indicated strong interjudge reliability, test-retest reliability and convergent agreement between the AAP and AAI classifications (Buchheim & George, 2011; Buchheim et al., 2008; George & West, 2001, 2003, 2011). However, one recent study did not find a convincing agreement between AAI and AAP attachment classifications (Jones-Mason, Allen, Hamilton, & Weiss, 2015). Thus, further research seems to be necessary to clarify these conflicting results. In the current study the AAP was conducted one year after the AAI to avoid confoundation effects. AAP transcriptions were rated by two trained coders. Interrater reliability was examined in $n = 10$ cases and resulted in an interjudge agreement of 90%.

Childhood Experience of Care and Abuse Questionnaire (CECA-Q). To assess childhood trauma, we used the CECA-Q (Bifulco et al., 2005), a retrospective self-report questionnaire. Its items were taken from and validated on the CECA interview (Bifulco, Brown, & Harris, 1994). The CECA-Q allows for the assessment of mother's and father's neglect and antipathy towards the child as well as parental physical abuse and sexual abuse before the age of 17. Experiences of maternal and paternal neglect and antipathy towards the child are each assessed by 8 items rated on a five-point scale from (1) "yes, definitely" to (5) "no, not at all". Parental physical abuse and sexual abuse are initially surveyed with screening questions. If one of these screening questions is answered with "yes", further questions about the characteristics (age, frequency, type etc.) of the abuse follow. The CECA-Q has shown satisfactory reliability and validity and significant correlations with the corresponding scales of the CECA interview for the English as well as for the German version (Bifulco et al., 2005; Kaess et al., 2011). In our sample, the internal consistencies of the parental care scales were mostly comparable to those of Bifulco et al. (2005), with $\alpha = 0.79$ for father's neglect, $\alpha = 0.80$ for father's antipathy and $\alpha = 0.84$ for mother's antipathy. Only the internal consistency of the mother's neglect scale was somewhat lower in our sample ($\alpha = 0.61$).

Structured Clinical Interview for DSM-IV (SCID). Mental disorders were assessed with SCID interviews (Wittchen, Zaudig, & Fydrich, 1997). The SCID is based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR: American Psychiatric Association, 2000) covering present and lifetime mental disorders, including personality disorders. All SCID interviews were conducted by 15 trained interviewers and verified by the last author of this paper.

Youth Self Report (YSR). The YSR (Achenbach, 1991) is a 112-item self-report questionnaire with good psychometric properties (Achenbach & Rescorla, 2001) designed for the assessment of behavioral competency and behavioral problems of children and adolescents. The response format is a 3-point scale from (0) „not true" to (2) „very true" or „often true". It provides scores for 8 subscales (withdrawn, somatic complaints, anxious/depressed, social problems, thought problems, attention problems, delinquent behavior, and aggressive behavior). Furthermore, it allows for deriving an externalizing symptoms score (sum of the scores of the withdrawn, somatic complaints and anxious/depressed scale) and an internalizing symptoms score (sum of the scores of the delinquent behavior and aggressive behavior scale). In the current study, we used the externalizing and the internalizing symptoms score to measure the extent of the adolescents' behavioral problems. The internal consistencies of the two scores were $\alpha = 0.88$ and $\alpha = 0.89$, respectively.

Psychopathic Personality Inventory – Revised (PPI-R). To assess the psychopathic traits of the adolescents, we used the German version of the PPI-R (Alpers & Eisenbarth, 2008), an 154-item self-report questionnaire with a 4-point response format from (1) "false" to (4) "true". From the responses, a total score and 8 subscales (Machiavellian egocentricity, social potency, coldheartedness, carefree nonplanfullness, fearlessness, blame externalization, impulsive nonconformity, and stress immunity) can be computed. In the current study, the PPI-R total score was used as a global index of psychopathy. The internal consistency of the PPI-R total score was $\alpha = 0.88$.

Cognitive Abilities. We used the IQ score of the Culture Fair Intelligence Test (CFT-20: Weiß, 1998) for assessing general intelligence. The CFT-20 is a non-verbal test measuring general mental capacity. In contrast to verbal intelligence tests, the CFT-20 depends to a lesser extent on sociocultural status and migration history (Weiß, 1998). The CFT-20 comprises 92 items that are assigned to 4 subtests (series, classification, matrices, and topologies). The total and subscale scores are the number of correct responses to the respective items. All raw scores can be transformed into standard values based on normative data (Weiß, 1998).

For assessing the German language skills of the adolescents, we applied the WST (Wortschatztest: Schmidt & Metzler, 1992), a vocabulary test assessing the ability to recognize German words accurately. It comprises 40 items, in which participants have to find the one word out of six that actually exists in the German language. The number of correct answers yields a score, which can be transformed to standard values. The authors reported a split-half reliability of $r = 0.95$, and an internal consistency of its total score of $\alpha = 0.94$. The test scores were not depending on age ($r = 0.08$) but they were positively correlated with educational attainment ($r = 0.60$).

2.3. Data analyses

Data were analyzed using IBM SPSS Statistics (version 20) and R (R Core Team, 2017). We tested normality assumptions for all variables using the *z*-scores of skewness ($z_{skewness}$ = skewness / $SD_{skewness}$). Since

the YSR externalizing and YSR internalizing scores were not normally distributed ($z_{skewness} = 4.94$ and $z_{skewness} = 4.82$, respectively) we conducted a square-root transformation that corrected the non-normality of these variables. The transformed variables were used in the following analyses. For ease of interpretation, means and standard deviations were reported for the non-transformed variables (see Table 1).

We first examined the distribution of the RFS scores and compared it to reports from non-clinical adult samples using *t*-tests. Between-group effect sizes were calculated according to Cohen's *d* (Cohen, 1988). Thereafter, we analyzed correlations between all study variables. Pearson's *r* was interpreted following the guidelines of Cohen (1988). Finally, we conducted a multiple regression analysis to examine the relationship of RF, psychopathy, and internalizing as well as externalizing symptoms. We included sex, migration background, and language skills in the model, because theoretical considerations and the aforementioned empirical results indicated that these variables may moderate the development of RF. We applied hierarchical regression models entering predictors in three steps: In the first step, we included sex, migration background and language skills. In the second step, we added RF and the PPI-R overall score. In the third step, we added the interaction terms RF*sex, RF*migration background, RF*language skills and RF*PPI-R. Categorical variables were dummy-coded. The effect size r^2 expresses the proportion of the variance in the dependent variable that is predictable from the independent variables. All statistical tests were two-sided; a *p*-value ≤ 0.05 was considered significant.

3. Results

3.1. RF in adolescent pupils

The average RF overall score was 4.0 ($SD = 1.4$) and almost the entire range of possible ratings has been used (range 1–7). Compared to the average RF scores of non-clinical adult samples (Chiesa & Fonagy, 2013: $M = 5.1$, $SD = 1.6$; Fonagy et al., 1996: $M = 5.2$, $SD = 1.5$), the score of the adolescent pupils was significantly lower with large effects ($t = -8.01$, $p < 0.001$, $d = 0.8$ and $t = -8.64$, $p < 0.001$, $d = 0.9$, respectively). The RF scores of the adolescent sample deviated slightly from a normal distribution (Kolmogorov-Smirnov's $Z = 1.42$, $p = 0.04$), which is corroborated by the histogram (Fig. 1, left diagram) and the Q-Q plot (Fig. 1, right diagram). The distribution was slightly platykurtic (kurtosis = –0.47), but nearly symmetric with a skewness of 0.034.

3.2. Correlations of study variables

Table 2 shows the correlations between all study variables. Regarding demographic data, we found a medium correlation of –.31 of sex and age, i.e., younger respondents were rather female. RF correlated strongest (medium to large) with language skills ($r = 0.41$). Both of these factors had medium correlations with migration (RF $r = -.28$; language skills $r = -.36$), hence migration seems somewhat influential. We found a medium correlation of RF and language skills ($r = 0.31$ for the migration subgroup and $r = 0.38$ for the non-migration subgroup). Moreover, we found small correlations of RF and the general intelligence ($r = 0.15$), sex ($r = 0.21$), age ($r = -.17$), childhood trauma ($r = -.19$) and attachment organization ($r = -.18$). The correlation between RF and age was even smaller in girls ($r = -.07$) than in boys ($r = -.15$). As to the clinical variables, psychopathy had a large correlation with externalizing symptoms ($r = 0.61$), a medium correlation with sex ($r = .36$) and a small correlation with childhood trauma ($r = 0.20$). Finally, we found small to medium correlations of externalizing and internalizing symptoms ($r = 0.25$) and of secure and organized attachment ($r = 0.28$).

3.3. RF and psychological adaptation

The hierarchical regression analyses were applied twice, predicting in turn YSR internalizing and externalizing symptoms. Table 3 shows the details of the first analysis (internalizing symptoms). In these three models, none of the chosen predictors explained variance (step 1: $R^2 = -.01$, $F_{(3,90)} = 0.86$, $p = 0.47$; step 2: $R^2 = 0.003$, $F_{(5,88)} = 1.05$, $p = 0.39$; step 3: $R^2 = 0.02$, $F_{(9,84)} = 1.15$, $p = 0.34$). We will therefore not consider these models further.

Table 4 shows the results of the second analysis (externalizing symptoms). After the first step, the model explained only two percent of the variance ($R^2 = 0.02$, $F_{(3,90)} = 1.74$, $p = 0.16$) and none of the predictors had a coefficient differing significantly from zero. In the second step, i.e., after adding RF and PPI-R, the proportion of explained variance increased considerably ($R^2 = 0.35$, $F_{(5,88)} = 11.19$, $p < 0.001$; $\Delta R^2 = 0.33$, $p < 0.001$). In this model, the PPI-R total score significantly predicted YSR externalizing symptoms ($\beta = 0.63$, $p < 0.001$). After the third step, i.e., adding the four interaction terms, 40% of the YSR

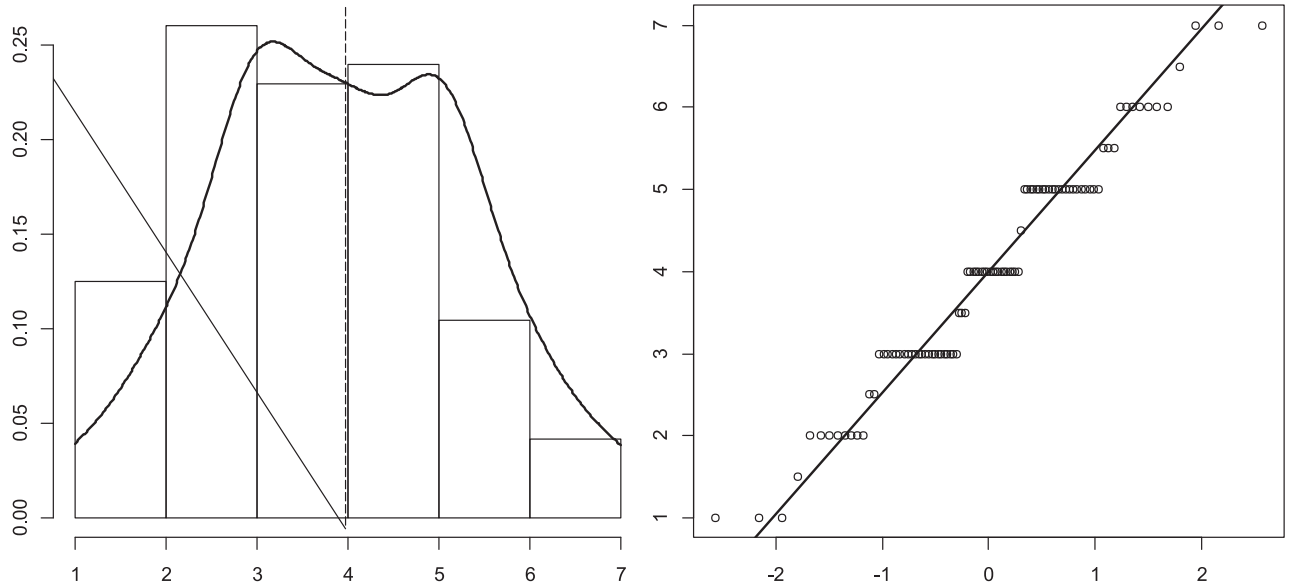

Fig. 1. Distribution of the reflective functioning score. Left diagram: Histogram and density estimator; the dashed vertical line indicates the mean. Right diagram: QQ-plot (RF vs. normal distribution).

Table 2
Correlations between all study variables.

1	2	3	4	5	6	7	8	9	10	11	12
RF	−0.17	.21*	−0.28*	.15	.41*	−0.19	−0.11	−0.05	−0.19	−0.06	−0.18
Age	-	−0.31*	.20	−0.01	−0.12	.08	.08	−0.01	.10	−0.11	.18
Sex (female)		-	−0.02	.05	.03	−0.36*	−0.15	.12	.07	.03	−0.05
Migration			-	−0.06	−0.36*	−0.09	−0.06	.09	.08	−0.14	−0.15
CFT-20				-	.45*	−0.06	.02	.02	.01	.18	−0.04
WST					-	−0.02	−0.14	−0.10	−0.14	.10	−0.08
PPI-R						-	.61*	.11	.20*	−0.11	.01
YSR ext[a]							-	.38*	.23*	−0.05	−0.03
YSR int[a]								-	.05	.07	−0.02
CECA-Q									-	−0.04	.02
AAP secure										-	.28*
AAP organized											-

Note. RF = Reflective Functioning; Migration = Migration background; CFT-20 = Culture Fair Intelligence Test; WST = German Vocabulary Test; PPI-*R* = Psychopathic Personality Inventory – Revised; YSR ext = Youth Self Report externalizing symptoms; YSR int = Youth Self Report internalizing symptoms; CECA-*Q* = history of childhood trauma according to the Childhood Experience of Care and Abuse Questionnaire; AAP secure = secure attachment according to the Adult Attachment Projective; AAP organized = organized attachment according to the Adult Attachment Projective.

[a] Variable was square-root transformed.

* $p < 0.05$ (two-tailed test).

externalizing scores variance could be explained ($R^2 = 0.40$, $F_{(9,84)} = 7.86$, $p < 0.001$; $\Delta R^2 = 0.07$, $p = 0.04$). Significant predictors were the RF overall score ($\beta = 3.21$, $p = 0.04$), the PPI-R total score ($\beta = 1.43$, $p < 0.001$) and the interaction term RF*PPI-R ($\beta = -2.84$, $p = 0.002$).

Regarding the significant interaction term (RF*PPI-R), we applied a median-split of PPI-R to further illustrate the effect: For adolescents with high (above-median) PPI-R scores, we found a medium negative correlation of RF and the YSR externalizing scores ($r = -.30$, $p = 0.04$) but for adolescents with low (below-median) PPI-R scores we only found a small positive correlation ($r = 0.19$, $p = 0.20$)

4. Discussion

Aim of this study was to examine in a sample of adolescent pupils the distribution of RF scores, the correlations between RF and sociodemographic data, and the influence of RF on psychological adaptation.

Regarding the distribution of the RF scores, the results were mostly in line with previous studies. The RF scores distribution was close to symmetric and only the extreme ratings (<1 and >7) remained unused. This is not surprising, as negative RF is generally rare in non-clinical samples and extremely high scores did not occur because RF capacities are not yet fully developed in adolescence. The mean RF score of the adolescent sample was somewhat lower than the mean RF scores of non-clinical adult samples, which conforms to the conjecture that RF development continues to improve through young adulthood (Dumontheil et al., 2010; Fonagy & Luyten, 2009; Keulers et al., 2010; Sebastian et al., 2008) and with the results of Borelli et al. (2015), Borelli et al. (2018a) and Taubner et al. (2013b).

Regarding the relationship of RF and sociodemographic data the results were in line with our hypotheses, too: We found significant correlations between RF, sex, language skills, and migration background, but neither between RF and general intelligence nor between RF and age. As in other studies on mentalization or theory of mind in children and adolescents (Baron-Cohen & Wheelwright, 2004; Caroll & Chiew, 2006; Chow et al., 2017; Rutherford et al., 2012; Walker, 2005), RF scores were higher in females. Whether these results are generally related to the sex of the subject or due more to a developmental lag in male adolescents (cf. Giedd et al., 1999) is an interesting question for future research. RF scores were also higher in adolescents with higher language skills or without a migration background. The correlation between RF and migration background seemed to be confounded by the

Table 3
Results of the stepwise hierarchical regression analysis predicting YSR internalizing symptoms (n = 94).

		Model fit			Regression coefficients				
	Predictor	R^2/ ΔR^2	$F_{(df)}$/ $\Delta F_{(df)}$	*p*	β	*t*	*p*	CI 95%	PC[a]
1	Sex	–.005	$0.86_{(3,90)}$	.465	0.12	1.18	.242	[–0.21, 0.83]	.12
	Migration				0.06	0.54	.593	[–0.41, 0.71]	.06
	WST				–0.08	–0.72	.472	[–0.06, 0.03]	–.08
2	Sex	.003	$1.05_{(5,88)}$	.393	0.19	1.67	.099	[–0.09, 1.03]	.18
	Migration	.028	$1.33_{(2,88)}$	.270	0.08	0.71	.479	[–0.36, 0.77]	.07
	WST				–0.07	–0.58	.567	[–0.06, 0.03]	–.06
	RF				–0.01	–0.07	.948	[–0.22, 0.21]	–.01
	PPI-R				0.18	1.60	.112	[–0.002, 0.02]	.17
3	Sex	.015	$1.15_{(9,84)}$	.336	0.23	0.61	.544	[–1.32, 2.49]	.07
	Migration	.054	$1.26_{(4,84)}$	.291	–0.63	–1.69	.095	[–3.47, 0.28]	–.18
	WST				–0.50	–1.55	.125	[–0.21, 0.03]	–.17
	RF				–1.98	–1.01	.315	[–5.38, 1.75]	–.11
	PPI-R				0.19	0.54	.588	[–0.02, 0.04]	.06
	RF*Sex				–0.10	–0.23	.821	[–0.51, 0.41]	–.03
	RF*Migration				0.74	2.06	.042	[0.02, 0.95]	.22
	RF*WST				2.28	1.42	.161	[–0.01, 0.05]	.15
	RF*PPI-R				–0.25	–0.22	.828	[–0.01, 0.01]	–.02

Note. The dependent variable (Youth Self Report internalizing symptoms score) was square-root transformed. Migration = Migration background; WST = German Vocabulary Test; RF = Reflective Functioning; PPI-*R* = Psychopathic Personality Inventory – Revised.

[a] Partial correlations.

Table 4
Results of the stepwise hierarchical regression analysis predicting YSR externalizing symptoms (n = 94).

		Model fit			Regression coefficients				
	Predictor	$R^2/\ \Delta R^2$	$F_{(df)}/\ \Delta F_{(df)}$	*p*	*β*	*t*	*p*	CI 95%	PC[a]
1	Sex	.023	$1.74_{(3,90)}$	.164	–0.15	–1.47	.146	[–0.81, 0.12]	–.15
	Migration				–0.13	–1.16	.249	[–0.79, 0.21]	–.12
	WST				–0.18	–1.64	.104	[–0.07, 0.01]	–.17
2	Sex	.354	$11.19_{(5,88)}$	< 0.001	–0.06	0.67	.503	[–0.27, 0.55]	.07
	Migration	.334	$24.04_{(2,88)}$	< 0.001	–0.05	–0.51	.613	[–0.52, 0.31]	–.05
	WST				–0.16	–1.71	.090	[–0.06, 0.01]	–.18
	RF				0.05	0.48	.636	[–0.12, 0.20]	.05
	PPI-R				0.63	6.92	< 0.001	[0.02, 0.03]	.59
3	Sex	.399	$7.86_{(9,84)}$	< 0.001	0.43	1.45	.150	[–0.36, 2.33]	.16
	Migration	.068	$2.65_{(4,84)}$	.039	–0.02	–0.08	.934	[–1.38, 1.27]	–.01
	WST				–0.07	–0.28	.777	[–0.10, 0.07]	–.03
	RF				3.21	2.10	.039	[0.14, 5.17]	.22
	PPI-R				1.43	5.36	< 0.001	[0.03, 0.07]	.51
	RF*Sex				–0.44	–1.32	.191	[–0.54, 0.11]	–.14
	RF*Migration				0.05	0.18	.855	[–0.30, 0.36]	.02
	RF*WST				–0.21	–0.17	.865	[–0.02, 0.02]	–.02
	RF*PPI-R				–2.84	–3.22	.002	[–0.01, –0.003]	–.33

Note. The dependent variable (Youth Self Report externalizing symptoms score) was square-root transformed. Migration = Migration background; WST = German Vocabulary Test; RF = Reflective Functioning; PPI-*R* = Psychopathic Personality Inventory – Revised.
[a] Partial correlations.

German language skills of the adolescents, however. Maybe it is even more difficult for adolescents with a migration background to talk about their attachment experiences in a non-mother tongue (see Ainslie et al., 2013). Regarding the correlation of RF and German language skills, one could assume that elaborated language skills promote a good performance in interview situations per se. In this case, the type of RF assessment would have the primary impact on the strong relationship between RF scores and language skills and, as a consequence, the language skills of the interviewee would have a strong impact on the RFS performance. On the other hand, elaborated language skills could also be specifically linked to RF capacities. The latter hypothesis is supported by results of previous studies finding high correlations of language skills of children and adolescents and several measures of their mentalization or ToM capacities (Astington & Jenkins, 1999; Cutting & Dunn, 1999; Peterson & Miller, 2012; Rutherford et al., 2012). Astington and Jenkins (1999) reported from a longitudinal study with children that language skills predicted later ToM test performance while ToM test performance did not predict later language skills, and concluded that language skills (e.g. syntactic ability and semantic understanding) might be a precondition for ToM performance. Alternatively, one could also assume that the development of language skills and ToM or mentalization capacities depend on the same preconditions, e.g., an adequate promotion of the developmental processes by the caregivers, and thus develop in parallel. The lack of correlation between RF and age is in line with previous study results, too (Chow et al., 2017; Taubner et al., 2013b). It may depend on the relative homogeneity in age of the sample (15–18 years). Another possible explanation is that RF development is not a linear process but rather proceeds by stepwise changes. Unfortunately our data does not allow for answering this question.

Regarding the relationship of RF and childhood trauma we only found a small and non-significant negative correlation. Attachment security and attachment organization were also not significantly correlated with RF. These results were not in line with our hypotheses, because RF theories as well as previous research on this topic argued that low RF should be linked to childhood trauma (Dauphin et al., 2013; Ensink et al., 2016) and to insecure and disorganized attachment patterns (Bouchard et al., 2008; Fonagy & Target, 1997; Fonagy et al., 2002; Humfress et al., 2002). Several reasons may account for these findings: (1) As expected in a non-clinical sample, childhood trauma was rare and less severe (compared to clinical samples). Maybe because of this the impact of childhood trauma on RF was less strong in the current sample. However, this should be further examined in future studies. (2) In the current sample, only 27% of the adolescents were classified as securely attached. This is a small part compared to previous results from studies with adults in which approximately half of the sample was classified as securely attached (see van IJzendoorn, 1995; van IJzendoorn & Bakermans-Kranenburg, 1996). However, our results are in line with those of Aikins et al. (2009) who also reported comparable rates of secure attachment in a low-risk adolescent sample. Moreover, these authors found some evidence for the assumption that attachment representations are not stable during adolescence. Only in 25% of their sample attachment representations were stable from childhood to adolescence. Aikins et al. (2009) discuss that during adolescence growing cognitive skills and autonomy can lead to a re-evaluation of attachment experiences and as a consequence to changing attachment representations. Furthermore, they speculate that an increase of life stressors during adolescence in combination with less support by parents and not enough skills to manage them on their own leads to an increased risk for dismissing and preoccupied attachment representations (Aikins et al., 2009). (3) In contrast to previous studies, two different measures were used to assess RF and attachment. The RF rating was based on AAI transcriptions, while the attachment rating was based on AAP transcriptions. Furthermore, the AAP interview took place one year after the AAI. Jones-Mason et al. (2015) discuss if the AAP generally underestimates secure attachment compared to the AAI and cite several studies using the AAP that found comparably low rates of secure attachment classifications. Furthermore, their own study results give some evidence for the assumption that an attachment classification based on the AAI is more clearly connected to early caregiving experiences and thus better suited to predict risks that arise from negative attachment experiences with the primary caregivers than an attachment classification based on the AAP (Jones-Mason et al., 2015). All in all, the heterogeneous results indicate the need for further research on this topic in clinical and non-clinical adolescent samples.

Finally, we analyzed the relationship of RF, psychopathy, and the psychological adaptation of adolescent pupils. In the regression analyses predicting YSR internalizing symptoms, the chosen predictors explained virtually no variance. In contrast, in the regression analysis predicting the YSR externalizing symptoms, RF, psychopathy (PPI-R total score), and the interaction between RF and psychopathy were significant predictors. The latter result is in line with the theoretical assumption that the etiology of externalizing symptoms involves mentalizing deficits, especially in children and adolescents with

psychopathic traits (Fonagy & Luyten, 2018). Fonagy and Luyten (2018) suggest that the inability to understand the self and others in terms of intentional mental states hinders an adequate regulation of interpersonal situations, which is based on perspective-taking and empathy. As a consequence, typical symptoms of externalizing disorders (e.g. violence, criminal behavior, impulsivity) may result. Regarding the relationship of mentalizing deficits and internalizing symptoms, the literature is still sparse and inconsistent (see Sharp & Venta, 2012). Our results may indicate that RF deficits are more specific to the etiology of externalizing disorders than to the etiology of internalizing disorders. We may also speculate that externalizing symptoms usually involve deficits regarding the psychic structure while internalizing symptoms are more often related to intrapsychic conflicts. However, our results could also indicate that RF scores are more influential in case of a severe psychopathology. In the current sample, psychopathy was correlated with externalizing symptoms (0.61) and childhood trauma (0.20), thus, adolescents with high levels of psychopathy were probably the most impaired ones in the sample.

Interestingly, a bivariate analysis revealed a medium negative correlation (–.30) of RF and YSR externalizing symptoms for adolescents with high PPI-R scores and a small positive correlation (0.19) for adolescents with low PPI-R scores. This might be seen as an indication that for low levels of psychopathy, RF and externalizing symptoms are mutually independent, whereas for higher levels of psychopathy, externalizing symptoms might be associated with low RF. This could indicate that RF may act as a protective factor, i.e. that high RF capacities prevent the development of externalizing symptoms in adolescents with a higher level of psychopathy. Such a tendency would be highly relevant for psychotherapeutic interventions due to the high heritability of and the genetic overlap between psychopathy and conduct problems (see Viding, Frick, & Plomin, 2007). If further studies succeed in showing that RF actually has a moderating effect on the development of externalizing symptoms in children with psychopathic traits, the enhancement of RF would turn out as a central goal in therapeutic and preventive approaches for children and adolescents with high levels of psychopathy.

Some limitations of the study must be noted. (1) The sample may be considered relatively small considering the number of predictors in the regression analyses (cf. Tabachnick & Fidell, 2014). Nevertheless, we obtained significant results and were able to find interesting indications regarding the possible importance of RF as a protective factor in dealing with adversities. It is to be expected that even more effects would become significant if we had a larger sample. However, taking into account the immense effort required to code the interviews, the present study is to our knowledge one of the largest undertaking this endeavour. (2) Due to the small sample size, the regression coefficients can be sensitive to outliers or otherwise atypical observations, especially regarding the interaction effects. In the current study, the largest Cook/Hebel values were 0.19 and 0.59, respectively; a check revealed that cases with extreme values did not alter the results to a practically relevant degree. Nonetheless, the reported results require validation with an independent sample. (3) The adult version of the RFS was used to assess RF in the adolescent sample. Meanwhile an adolescent version (RFS – Adolescent) has been developed, which is based on the more age-appropriate CAI. Since adolescents have to face the developmental task of giving a new meaning to their childhood, it may be less difficult for them to answer the CAI questions, which ask for the current relationship to parents, than to answer the AAI questions, which ask for early childhood experiences. However, this adolescent version did not yet exist when data were collected for the current study. Maybe the RF scores of the adolescent pupils would have been somewhat higher if we had used the RFS – Adolescent. This should be further evaluated in future studies. (4) Some authors state that adolescence may be accompanied by a mentalization breakdown, especially in the context of family conflicts (e.g. Bleiberg, 2013). If this has an influence on the measurement of RF in adolescence has to be further investigated. We also did not assess the parents' RF, which has been shown to be relevant for adolescents' RF as well (e.g. Benbassat & Priel, 2012; Rosso et al., 2015). (5) An already mentioned limitation refers to the fact that the AAP was conducted one year later than the rest of the examinations. Thus, at least the non-significant results regarding attachment patterns and RF could partly be due to this delay in time. (6) The examined sample had a high percentage of adolescents with a migration background. This seems important, since adolescents with migration background showed differences in some of the examined variables (lower German language skills and lower RF scores). Whether this is due to cultural differences (e.g., different parenting styles) or to developmental specifics of children from migration families (e.g., less elaborated language skills limiting the development of RF skills) cannot be answered with our data. (7) Since the adolescents were recruited from public schools, all study participants were still attending school regularly. Given that only a few adolescents showed psychiatric symptoms or reported psychiatric or psychotherapeutic treatment, one could suppose that the sample consisted of adolescents with a more or less stable family background and/or good resilience factors. (8) The correlation of RF and language skills reveals the possible influence of language skills on the assessment of RF. This could have resulted in biases especially in the case of adolescents with a migration background. (9) The cultural aspect could only be approximated by coding migration background. For an adequate account, a more sophisticated assessment and a multi-center approach would have been necessary, which was far beyond the scope of the present study. (10) The disappointing interrater reliability of single RFS items remains an open question, as it indicates that the results depend to an undesirable extent on the rater. This issue has to be tackled in further studies (e.g., by improving rater guidelines or the rater training).

5. Conclusion

As pointed out above, the current study is one of the few examining the RFS in an adolescent sample. All in all, the results of the current study are promising and give further evidence for the importance of examining RF in adolescent individuals. The possible importance of RF as a protective factor in dealing with adversities should be considered in psychotherapy and prevention programs. Unfortunately, some questions cannot be answered on the basis of our data. The correlation between RF and language skills in particular is subject to review.

Conflict of interest

The authors declare that they have no conflict of interest.

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Supplementary materials

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