EMPATHY IN INSTITUTIONALIZED ADOLESCENTS WITH CALLOUS-UNEMOTIONAL TRAITS

An Ecological Momentary Assessment Study of Emotion Recognition

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Callous-unemotional (CU) traits are associated with impaired distress recognition, possibly leading to suboptimal empathy development. Evidence stems from computerized task results, having little in common with day-to-day experiences. We assessed institutionalized adolescents' empathic accuracy in their ability to infer staff members' emotions, using Ecological Momentary Assessment. A sample of 55 adolescents reported perceived levels of distress and anger in staff, 4 times per day over the course of 8 days. CU traits were assessed with the Youth Psychopathic Traits Inventory, and data were submitted to multilevel regression analyses. All adolescents well identified anger and distress; high CU adolescents even overestimated both anger and distress intensities. Our ecological data suggest that in real-life situations, cognitive empathy skills may compensate for high CU adolescents' distress recognition impairment. However, this compensatory process results in the perception of excessively negative emotions.

Keywords: adolescence; callous-unemotional; empathy; emotion recognition; Ecological Momentary Assessment

Adolescents with callous-unemotional (CU) traits are often perceived as emotionally detached and uncaring but for themselves, showing little compassion for others and regret about their hostile actions. These characteristics may be rooted in empathy

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dysfunction (Frick & White, 2008). Modeled on the affective-interpersonal dimension of adult psychopathy, CU traits are thought to be a developmental precursor to psychopathic traits in adulthood (Pasalich, Waschbusch, Dadds, & Hawes, 2014). Thus, in adolescents, despite its overlap with conduct problems, CU traits are considered distinct risk-related affective-interpersonal features (Pasalich et al., 2014). Among delinquent adolescents, CU traits therefore identify a specific high-risk subgroup frequently involved in various types of serious crimes and assaults, and using more proactive aggression (Frick & Moffitt, 2010). In addition, CU traits are associated with a poor response to traditional treatment approaches (e.g., Frick & Moffitt, 2010). As a result, CU traits have been included in the fifth revision of the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; American Psychiatric Association [APA], 2013) as a specifier (i.e., with limited prosocial emotions) to conduct disorder (CD).

Lack of empathy is a defining feature of CU traits (Frick & Viding, 2009). Empathy is defined as a shared emotional response resulting from comprehension *and* appreciation of the emotional state of others (Eisenberg, Eggum, & Di Giunta, 2010). Empathy is therefore understood as a multidimensional phenomenon comprising both cognitive and affective components (Wai & Tiliopoulos, 2012). Affective empathy refers to the ability to feel what other people feel—comparable with the construct of emotional contagion or sharing—and is characterized by visceral, automatic reactivity (Mehrabian & Epstein, 1972). Cognitive empathy refers to the ability to understand and describe what other people feel and why they feel that way, without necessarily experiencing emotional contagion (Wai & Tiliopoulos, 2012). The latter ability (accurately describing or inferring the emotional state of others) is also called empathic accuracy (Ickes, 1993). Empathic accuracy does not necessarily imply sharing the other person's emotional state (Rauers, Blanke, & Riediger, 2013). Reduced abilities to share and/or infer others' emotional distress are thought to be at least in part responsible for the serious and chronic conduct problems of high CU adolescents. Such empathy dysfunction may prevent these adolescents to access cues leading to aggressive behavior inhibition (Jolliffe & Farrington, 2004). This association between empathy deficits and CU traits has received substantial scientific attention. Several recent laboratory studies have demonstrated that adolescents with high CU traits are less affected by the emotional situation of others, but show empathic accuracy, therefore revealing no cognitive empathy impairment (e.g., Anastassiou-Hadjicharalambous & Warden, 2008; Jones, Happé, Gilbert, Burnett, & Viding, 2010). This body of empirical evidence has led to conceptualizing CU traits as associated with specific deficits in affective empathy along with functional cognitive empathy (Blair, 2013).

The component of affective empathy is presumed autonomic and attributed to the amygdala (Mehrabian & Epstein, 1972). A current putative hypothesis is that high CU individuals may suffer from an amygdala dysfunction resulting in an impaired recognition of distress-related emotions and reduced empathic responses (Blair, 2013). The accurate recognition of others' emotions is indeed an underlying skill and as such a prerequisite for adequate inference and sharing of others' emotional state, in other words, for empathy development (Blair, Mitchell, Peschardt, et al., 2004). Several studies in different clinical populations have empirically demonstrated a close relation between impaired emotion recognition and empathy deficits (e.g., Blair & Coles, 2000; Carr & Lutjemeier, 2005; Gery, Miljkovitch, Berthoz, & Soussignan, 2009). Among high CU adolescents in particular, a large body of evidence has been gathered over the past decade. This evidence points to an impaired recognition of distress-related emotions, whereas the recognition of other emotions such as surprise or anger

seems unaffected. Most of these studies focused on the recognition of facial expressions, some on paraverbal cues, and one on body language (for a comprehensive review, see Frick, Ray, Thornton, & Kahn, 2014).

This bulk of evidence is largely built on experimental testing in laboratory settings using static or dynamic computerized emotion recognition tasks (Dawel, O'Kearney, McKone, & Palermo, 2012; Wilson, Juodis, & Porter, 2011). Tasks are predominantly based on visual cues making use of unimodal faces picturing six basic emotions (anger, happiness, disgust, fear, sadness, surprise). Although some computerized stimuli were dynamic, namely, a neutral face gradually morphing through incremental stages into one of the six prototypical expressions (Blair, Colledge, Murray, & Mitchell, 2001), they presented only pure and context-free emotions. Such procedures are essential to maximize the internal validity. Yet, impaired emotion recognition in the laboratory does not necessarily imply corresponding deficits in daily life emotion inference. Visual sensory cues are just one particular aspect of all available interpersonal information (Krueger & Funder, 2004). Inferring others' emotions can also be affected by one's own behavior and affective and relational experience (Gadassi, Mor, & Rafaeli, 2011). As a consequence, this line of research lacks ecological validity, questioning the transferability of those findings to everyday life interactions.

To the best of our knowledge, no study has investigated empathic accuracy in adolescents with CU traits in a daily life ecological context. Daily life studies offer a unique opportunity to better understand emotion recognition. Indeed, a context is required in which adolescents can infer others' emotions making use of a wide range of interpersonal information, varying from accurately perceiving sensory cues to efficiently using acquired knowledge (Rauers et al., 2013). The aim of the present study was to start filling this gap by using Ecological Momentary Assessment (EMA). EMA assesses actual perceptions, emotions, and behaviors as they occur in the natural settings of interest, therefore maximizing ecological validity (Fahrenberg, Myrtek, Pawlik, & Perrez, 2007).

EMA studies on adolescents are still scarce, and research on adults has focused solely on those involved in romantic relationships. Wilhelm and Perrez (2004) were the first to introduce daily diaries into the study of empathy. They examined partners' perception about the others' emotions (sad–happy, tense–relaxed, unsatisfied–satisfied) and focused primarily on bringing research out of the laboratory into participants' daily lives (Wilhelm & Perrez, 2004). A second study on individual differences in empathic accuracy used a daily process method assessing cohabiting partners' feelings once a day during 3 weeks (Howland & Rafaeli, 2010) and demonstrated that momentary states versus more global patterns reflect different types of accuracies. In a study on depression by Gadassi et al. (2011), every evening over a period of 3 weeks, participants completed diaries with questions about their own and their partners' negative (e.g., anger, anxiety) and positive (e.g., happiness, calmness) feelings. This study revealed, among other results, an impairment to correctly infer negative emotions. The authors proposed that repeated experiences of rejection lead depressed individuals to develop a heightened sensitivity to negative interpersonal information (Gadassi et al., 2011). Finally in an experience-sampling study, Rauers and collaborators (2013) investigated younger and older couples' empathic accuracy in daily life. Participants rated their own and their partner's emotions during 15 days, with six daily assessments. The study demonstrated different skills for empathic accuracy: those associated with acquired knowledge, which remains steady throughout life, and skills associated with sensory cues, which declines throughout life (Rauers et al., 2013).

Regarding institutionalized adolescents, prior EMA studies had other focuses. One EMA study was conducted on juvenile offenders (Farnworth, 2000) focusing on time use during probation. Another EMA study was conducted on incarcerated young adults and had a nutritional focus (Eves & Gesch, 2003). Only one EMA study involved both incarcerated and juvenile offenders and evaluated the feasibility and reliability of EMA (Pihet, De Ridder, & Suter, 2015). This last study supports feasibility and suggests that EMA allows reliable data collection in such a challenging population (Pihet, De Ridder, et al., 2015). The present study seems to be the first to assess everyday empathic accuracy in institutionalized adolescents with high and low CU traits.

Our primary aim was to investigate the transferability of the evidence built from laboratory studies regarding high CU adolescents' impaired distress recognition to the complexity of everyday life situations. For this purpose, we assessed institutionalized adolescents' empathic accuracy in their ability to infer the emotions experienced by familiar adults in their natural interactions across a wide range of real situations (Pihet, 2000). We acquired repeated real-time parallel assessments of adolescents' perceptions of staff members' emotions and of staff members' experienced emotions, while they were going about their daily activities in their usual environment. We focused on emotions within the anger (angry, irritated) and distress (stressed/worried, destabilized) scope, as they are commonly experienced in our context of interest. The latter is not the case for fear and sadness (pilot work in teachers revealed that they nearly never experienced fear and sadness in their daily interactions with students). Thus, while there is an overlap with the construct of distress typically assessed in computerized emotion recognition tasks, it is important to note that both constructs are not identical. In addition, measuring anger and distress inference seems suitable for the assessment of mixed emotions, in contrast to anger or distress in prior lab studies, as in real life one can experience both emotions concurrently. Following the current results in the literature, we expected high CU adolescents to show less empathic accuracy for distress-related emotions in staff members and to show normal performance in inferring other emotions, namely, anger.

Subsequent to empathic accuracy is the affective sensitivity, measured as the estimation of the intensity of the adequately inferred emotion. Consequently, a secondary aim of our study was to investigate whether high CU adolescents, in case of good empathic accuracy, would globally underestimate distress—and not anger—intensities, compared with their low CU counterparts, by controlling for staff members' reported intensity. We expected adolescents' ability to use available distress-related sensory cues to be moderated by CU traits. Their ability to use acquired knowledge may be less affected though, as cognitive empathy skills seem intact for low and high CU adolescents. An additional aim was to explore how empathic accuracy is related to adolescents' own behavior, and own affective and relational experience.

METHOD

PARTICIPANTS

Seventy-one institutionalized adolescents were recruited as part of a larger study conducted in youth welfare and juvenile justice institutions in the French-speaking part of Switzerland,[1] from two forensic facilities (n = 34) and two boarding schools accommodating adolescents with behavioral and/or learning disorders (n = 37). The boarding schools

TABLE 1: Sample Characteristics

Characteristic	Sample (N = 55)
Recruitment place	
Boarding school	36 (65%)
Forensic facility	29 (35%)
Age (years)	14.8 ± 0.87
Boys	45 (82%)
Swiss nationals	30 (55%)
French mother tongue	39 (81%)
SES	
High	7 (12%)
Middle	37 (68%)
Low	11 (20%)
SPM score	43.15 ± 6.40
CD diagnosis	28 (51%)

Note. The figures are mean values (±*SD*) or frequency (and %). SES = socioeconomic status; SPM = Standard Progressive Matrices of Raven; CD = conduct disorder.

were chosen for their mixed socioeconomic status (SES) population and their activity schedule comparable with that of the two forensic facilities. They accommodated the adolescents from Sunday evening to Friday afternoon and offered daily sport activities.

Ninety percent of the recruited adolescents completed the study. Noncompletion resulted from the adolescent's refusal to participate (n = 1) or from drop-out due to lack of motivation (n = 5) or integration in an external program (n = 1). In addition, exclusion criteria were a possible intellectual disability assessed with the Standard Progressive Matrices (SPMs; n = 2) of Raven and lack of sufficient French language skills (n = 1). Six participants (8% of completers) were excluded from analyses because of insufficient (n = 3) or invalid (n = 1) EMA data, or insufficient staff reports (n = 2). No significant differences were observed between completers and noncompleters on gender, nationality, or mother tongue. Compared with completers, noncompleters were however slightly older (M = 14.8, SD = 0.87 and M = 15.57, SD = 0.73 years old, respectively), $U(64) = 221$, $p = .011$, as well as more likely to have been recruited in a forensic facility (35% and 94%, respectively), $\chi^2(1) = 17.41$, $p < .001$, and to come from a low SES family (20% and 67%, respectively), $\chi^2(2) = 11.83$, $p = .003$.

The final sample consisted of 55 adolescents with the sample's characteristics presented in Table 1. Variables of interest are perceived staff anger and distress, staff-reported anger and distress, participants' own negative affect, misbehavior and interpersonal conflicts with staff, and participants' CU traits. CU traits were not confounded with any sociodemographic characteristic, as they were not significantly associated with gender, age, nationality, mother tongue, nonverbal intelligence, or SES. CU traits were however higher in adolescents with a CD diagnosis (r = .34, p = .011), which was therefore controlled in all analyses so that all results reflect the effect of CU traits independent of CD. Consequently, this study focused on the participants' affective and interpersonal style and not on the conduct problems themselves (Frick et al., 2014). Recruitment place was also significantly associated with some of the variables of interest (i.e., perceived anger and distress, misbehavior and interpersonal conflicts) and was therefore equally controlled. Gender and age were not associated with any variable of interest.

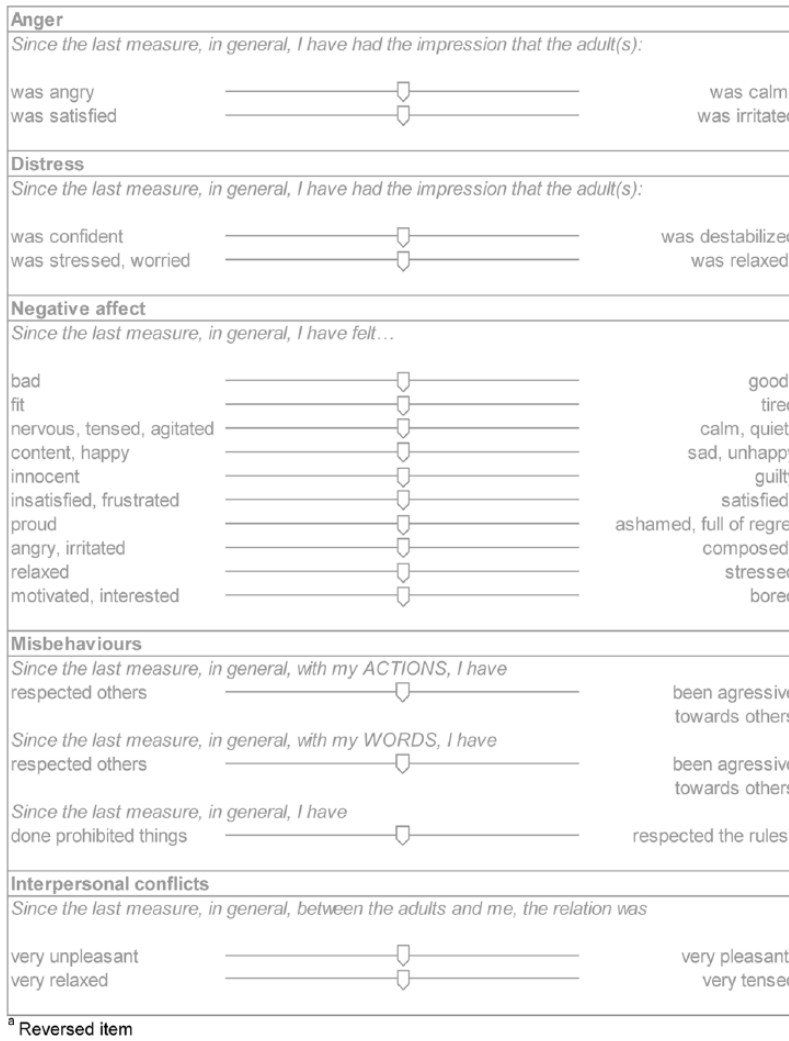

Figure 1: EMA Items
Note. EMA items measuring the intensity of anger (two items) and distress (two items) perceived in staff members, as well as the intensity of negative affect (10 items), misbehaviors (three items), and interpersonal conflicts (two items). EMA = Ecological Momentary Assessment.
a. Reversed item.

PROCEDURE

The study procedure was approved by the local ethics committee, and agreements were obtained from the principals of the boarding schools and directors of the forensic institutions. First, we presented the research and guaranteed the confidentiality of responses and freedom to withdraw from the study any time without consequences. Then, written consent was obtained from the participants and one of their parents or legal guardian.

EMA consisted of a time-sampling procedure with four measures per day (morning, noon, afternoon, and evening) during 8 days (for the EMA items, see Figure 1). During the EMA period, participants responded to the questions on their Personal Digital Assistant (PDA). In

the forensic facilities, the PDAs beeped to remind participants to answer the questions as soon as possible. In the boarding schools, teachers distributed PDAs during class hours at planned time points. Time intervals were chosen, so as to cover the complete day with minimal interference with the daily routine. The compliance was very satisfactory, with a median of 24 valid measures (80%) of 30 possible measures (the first morning and last evening measures were always skipped for practical reasons). This is remarkably high for an institutionalized sample. For instance, in a study of Henker, Whalen, Jamner, and Delfino (2002) where a community sample of 13- to 16-year-olds reported on their moods, activities, social settings, dietary intake, smoking, and alcohol use, the compliance did not exceed 80%, as is common in EMA studies.

Forty-seven staff members contributed to this study. Staff compliance was much lower than expected: They provided on average only 11 valid measures (37%) of the 30 measures expected at minimum. It was nevertheless possible to analyze momentary associations between adolescent and staff reports.

The collection of standard demographic information, the completion of the Youth Psychopathic Traits Inventory (YPI) and SPM, as well as the EMA training were conducted by trained research psychologists. Assessment and EMA training occurred in individual sessions in the forensic facilities and small group sessions in boarding schools (maximum of 10 participants for assessment and maximum of three for EMA training sessions). The Schedule for Affective Disorders and Schizophrenia for School-Age Children–Present and Lifetime version (K-SADS-PL) interview was conducted by a qualified research psychologist in an individual setting. All adolescents received an individualized feedback on their personal results.

MEASURES

EMA

Figure 1 provides an overview of EMA items and their response formats. Adolescents reported the intensity of anger (mean of two items, Anger) and distress (mean of two items, Distress) they perceived in staff members. They also reported the intensity of their own negative affect (mean of 10 items), misbehaviors (mean of three items), and interpersonal conflicts with staff members (mean of two items). Questions were presented on the screen of a PDA, on which answers were given by moving a cursor on a Visual Analogue scale, which yielded a score between 0 and 100. The median Cronbach's alpha was .77 for Anger and .76 for Distress. Internal consistency was good, in particular considering the small number of items.

Staff Reports

Staff members were instructed to report their own levels of anger and distress after each period of at least 1 hour spent with the adolescent. They made use of identical items to those used for adolescents, only in a paper-and-pencil version. Scores were computed in the same way as for adolescents. The median Cronbach alpha was .89 for anger and .87 for distress. Internal consistency was excellent.

YPI

CU traits were assessed using the YPI (Andershed, Kerr, Stattin, & Levander, 2002), a 50-item self-report questionnaire. The YPI is specifically designed to reduce the influence of

social desirability on responses and to facilitate endorsement by describing feelings and opinions as competencies rather than deficiencies. Participants were asked to estimate the degree to which each individual item applies to them, using a 4-point Likert-type scale ranging from 1 (*does not apply at all*) to 4 (*applies very well*). The YPI measures three core dimensions of psychopathy using its Lifestyle, Interpersonal (YPI-Int), and Affective (YPI-Aff) scales, and captures essential features of the emotional life. It assesses callousness or emotional insensitivity, focusing on reduced emotional contagion and the perception of emotions as weaknesses. It also assesses unemotionality or emotional impassibility, focusing on reduced fear and sadness experience (Pihet, Etter, Schmid, & Kimonis, 2015). The YPI, just as most existing measures, has therefore only partial coverage of CU traits[2] as CU traits are historically considered part of the larger psychopathy construct (Frick & Ray, 2014). As users of the YPI may rely on its scale scores separately (Pihet, Suter, Meylan, & Schmid, 2014), we opted for this instrument focusing solely on its CU traits scales and computed a CU score by taking the average of the YPI-Int and YPI-Aff scales. The YPI has shown good psychometric properties, and its scores accurately predict various forms of deviant conduct (Skeem & Cauffman, 2003). We used the French version of the YPI (D'Acremont, Van der Linden, Axelson, Flykt, & Vonèche, 2002), which has shown good psychometric properties as well (Pihet et al., 2014).

SPMs

The SPMs (Raven, Court, & Raven, 1998) were administered to provide an estimate of nonverbal intelligence. The SPMs are made up of a series of designs with a part missing. Participants have to select the correct part to complete the designs from a number of options printed beneath. The SPMs have been shown to provide a valid measure of intelligence independent of language abilities and formal schooling (Raven, 2000). A 20-min time limit was used, for which norms are available for French adolescents (Raven et al., 1998). Participants scoring lower than 30 (5th percentile) were excluded from the study. This exclusion criterion was used as an estimator for possible intellectual disability.

K-SADS

The presence of CD was assessed using a validated semistructured diagnostic interview, the K-SADS-PL (Chambers et al., 1985). This reliable interview evaluates current and past episodes of psychopathology in children and adolescents (including CD), according to the *DSM-* (4th ed.; *DSM-IV*; APA, 1994) criteria. Due to time restrictions, we were not able to conduct the complete K-SADS-PL in all participants. The CD part was however administered systematically as CD was used as a control variable.

DATA ANALYSIS

As measurement points are nested within individuals, data were analyzed using hierarchical linear modeling (HLM), namely, a two-level model with perceived staff anger (PSAng) or distress (PSDis) as dependent variables. The variance in PSAng or PSDis was predicted on

1. the intraindividual level (Level 1) from staff-reported anger (SRAng) or distress (SRDis), and in exploratory analyses by negative affect, misbehavior, and interpersonal conflicts with staff, all entered as grand-mean-centered predictors.
2. the interindividual level (Level 2) from CU traits, entered as a grand-mean-centered predictor.

Equation 1 (using anger as an example) presents the most complex model tested.

$$\text{Level 1: PSAng} = \gamma_0 + \gamma_1\,\text{SRAng} + \gamma_2\,\text{Negative Affect} + \gamma_3\,\text{Misbehavior} + \gamma_4\,\text{Conflicts} + E$$

$$\text{Level 2}: \gamma_0 = \beta_{00} + \beta_{01}\text{RPlace} + \beta_{02}\text{CD} + \beta_{03}\text{CU Traits} + R_0$$

$$\gamma_1 = \beta_{10} + \beta_{11}\text{RPlace} + \beta_{12}\text{CD} + \beta_{13}\text{CU Traits} + R_1$$

$$\gamma_2 = \beta_{20} + \beta_{21}\text{RPlace} + \beta_{22}\text{CD} + \beta_{23}\text{CU Traits} + R_2$$

$$\gamma_3 = \beta_{30} + \beta_{31}\text{RPlace} + \beta_{32}\text{CD} + \beta_{33}\text{CU Traits} + R_3$$

$$\gamma_4 = \beta_{40} + \beta_{41}\text{RPlace} + \beta_{42}\text{CD} + \beta_{43}\text{CU Traits} + R_4 \quad (1)$$

An identical model was tested separately for distress. To increase power, the final models were estimated including only the significant predictors. Effect sizes (r^2) were estimated by computing the variance in the outcome variable explained by each predictor separately after controlling for staff-reported emotions.

Level 2

We always controlled for CD and recruitment place (RPlace), entered as Level 2 predictors (see Equation 1). CD had no significant effect outside adolescents with this diagnosis had a weaker association between misbehavior and PSAng ($\beta_{32} = -.26$, $p = .024$). We will therefore only present results on CU traits. We also conducted exploratory analyses with the interaction between CD and CU traits as an additional Level 2 predictor, along with RPlace, CD, and CU. As its effect was consistently nonsignificant, we did not include the interaction term in the final model.

In this model, β_{00} reflects the average level of PSAng (higher values corresponding to higher intensity). β_{10} reflects the momentary association of PSAng with SRAng (more positive values indicating better emotion recognition), β_{20} with negative affect (positive values indicating that, at times where they experience more negative affect, adolescents perceive more anger in staff members), β_{30} with misbehavior, and β_{40} with conflicts.

Level 1

Level 1 parameters were further predicted from CU traits. Predicting the *intercept* γ_0, a positive β_{01} indicates that higher CU traits are associated with higher PSAng. Predicting the *slopes* γ_1 to γ_4, a positive β_{13} indicates that higher CU traits are associated with a more positive momentary association between PSAng and SRAng (or negative affect for β_{23}, misbehavior for β_{33}, and conflicts for β_{43}).

RESULTS

DESCRIPTIVE RESULTS

As all variables were measured on a 0 to 100 scale, adolescents perceived staff members as quite low on anger ($\beta_{00} = 29.81$, $SE = 2.28$) and distress ($\beta_{00} = 27.42$, $SE = 1.93$), on average

across the 8 days of EMA; a core part of the variance in these variables was found on the intraindividual level (57% for PSAng and 63% for PSDis), indicating that moment-to-moment variations were more important than interindividual differences. On average across the EMA period, staff members also reported experiencing rather low levels of anger (β_{00} = 30.43, *SE* = 2.25) and distress (β_{00} = 25.31, *SE* = 2.42) toward these adolescents, again with an important part of the variance found on the intraindividual level (71% for SRAng and 42% for SRDis). With regard to themselves, adolescents reported a moderate intensity of negative affect (β_{00} = 26.75, *SE* = 2.99), misbehaviors (β_{00} = 26.75, *SE* = 3.14), and interpersonal conflicts with staff members (β_{00} = 29.33, *SE* = 3.09).

Effect of CU Traits

As expected, adolescents with higher CU traits reported far more daily misbehavior (β_{03} = 13.91, p = .003, r^2 = .21) in terms of both aggression (β_{03} = 13.49, p = .015, r^2 = .18) and rule-breaking (β_{03} = 14.75, p = .004, r^2 = .18). They also reported significantly more interpersonal conflicts with adults (β_{03} = 9.66, p = .037, r^2 = .09). Staff members reported experiencing significantly more distress (β_{03} = 14.95, p = .001, r^2 = .20) toward these challenging adolescents. After controlling for staff-reported emotions, adolescents with higher CU traits did perceive staff members as significantly and substantially more angry (β_{03} = 14.22, p < .001, r^2 = .08) and distressed (β_{03} = 10.86, p < .027, r^2 = .15).

EMOTION RECOGNITION: CORRELATIONS BETWEEN STAFF REPORTS AND ADOLESCENTS PERCEPTIONS

Overall, adolescents showed good empathic accuracy: They inferred more anger when staff reported more anger (β_{10} = .08, p = .021, r^2 = .09) and more distress when staff reported more distress (β_{10} = .21, p < .001, r^2 = .22). Results on accuracy are presented in Table 2, along with context variables (see below) and effect of CU traits.

Moderating Effects of CU Traits

We observed no moderation effect of CU traits on empathic accuracy, indicating that the perceptions of high CU adolescents were as strongly associated with staff reports as those of their low CU counterparts.

CONTEXT VARIABLES ASSOCIATED WITH ADOLESCENTS' PERCEPTIONS OF STAFF EMOTIONS

All adolescents perceived more anger and distress in staff members at times where they reported more interpersonal conflicts with them (β_{40} = .27, p = .001, r^2 = .09; β_{40} = .16, p = .004, r^2 = .12, respectively). Moreover, all adolescents perceived more anger in staff when experiencing more negative affect themselves (β_{20} = .43, p = .001, r^2 = .15) and more distress in staff when being more disruptive (β_{30} = .30, p = .001, r^2 = .22; see Table 2).

Moderating Effects of CU Traits

We observed no moderating effect of CU traits regarding context variables associated with PSDis. However, higher CU traits predicted a significantly stronger association between PSAng and misbehavior (β_{33} = .23, p = .030, r^2 = .08; see Figure 2 and Table 3). In

TABLE 2: Multilevel Regression Analyses of Adolescents' PSAng and PSDis: Accuracy, Context Variables, and CU Traits

	Dependent Variable	
Predictor	PSAng	PSDis
Level 1		
SRAng	**.08***	
SRDis		**.21****
Negative affect	**.43****	.09
Misbehavior	.07	**.30****
Conflicts	**.27****	**.16****
	Intercept (Controlling for SR Emotions) β_{03}	
Level 2		
CU	**14.22****	**10.86***

Note. PSAng = Perceived Staff Anger; PSDis = Perceived Staff Distress; CU = callous-unemotional; SRAng = Staff-Reported Anger; SRDis = Staff-Reported Distress.
*$p < .05$. **$p < .01$.

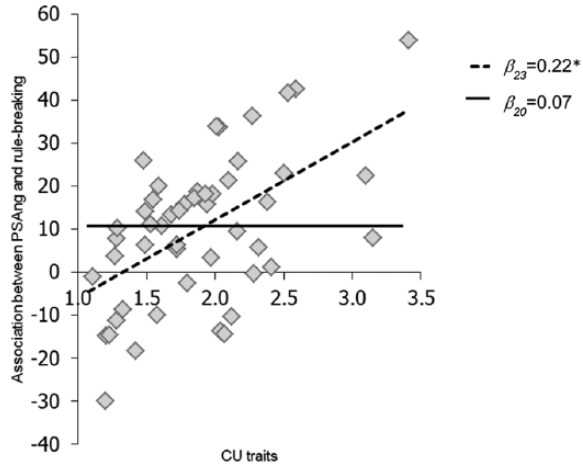

Figure 2: Moderating Effect of CU Traits on the Moment-to-Moment Association Between Rule-Breaking and PSAng

Note. CU = callous-unemotional; PSAng = Perceived Staff Anger.
*$p < .01$.

other terms, high CU adolescents perceived more anger in staff members when they were misbehaving, in particular when they broke the rules ($\beta_{33} = .22$, $p = .009$, $r^2 = .15$), while the effect did not reach significance regarding aggressive behavior ($\beta_{33} = .17$, $p = .163$, $r^2 = .06$).

DISCUSSION

This novel application of EMA confirmed that adolescents with high CU traits also perform in the normal range for anger recognition in ecologically valid situations. Interestingly,

TABLE 3: Multilevel Regression Analyses of Adolescents' Perceived Staff Anger: Moderating Effects of Callous-Unemotional Trait

Level 1 Parameters	Estimate	*SE*	*T*	*df*	Significance
Negative affect	–.40	0.24	–1.65	45	.10
Misbehavior	**.23**	0.10	2.23	45	**.03**
Conflicts	.14	0.16	0.92	45	.36
SRAng	.11	0.11	0.99	45	.33

Note. Perceived staff anger: Dependent variable; callous-unemotional traits: Level 2 predictor; SRAng = staff-reported anger.

our data revealed that high CU adolescents were also unexpectedly as accurate as low CU adolescents in inferring distress in staff members, and notably overestimated the general intensity of both anger and distress. They specifically inferred more anger in others when they were engaged in disruptive actions.

Our findings corroborated the normal recognition of anger (Dawel et al., 2012) observed in computerized tasks in adolescents with high CU traits, positing this expression as being a strong signal well identified in both laboratory and ecological settings. Howland and Rafaeli (2010) suggested that inferring anger accurately may involve mechanisms similar to those used in detecting positive emotions, as anger may be strongly tied to the behavioral activation system. In contrast, other mechanisms may be involved in studying the empathic accuracy for negatively activated emotions, which include fear and sadness as well as stress, worries, and destabilization (Howland & Rafaeli, 2010). This understanding supports our choice to contrast anger and distress recognition, even when the latter only partially overlaps prior distress operationalizations. High CU adolescents' distress recognition in everyday life interactions, in stark contrast to computerized task results, did not show the expected impairment. According to recent neurobehavioral studies, individuals with psychopathic traits are indeed able to display normal responses to affective information (e.g., others' distress) but may not award it the necessary attentional resources unless the task or goal requires it (Larson et al., 2013; Newman & Baskin-Sommers, 2011). Despite sample differences (adults with psychopathic traits vs. adolescents with CU traits), our results could be interpreted in this light. Indeed, answering 4 times a day questions explicitly referring to others' emotional state may have increased the relevance of emotion identification and in turn the mobilization of attentional resources for this purpose, which might have ultimately led to a normal perception of distress.

Another key finding of the present study is that, contrary to our expectations and in contrast to their low CU peers, high CU adolescents perceived staff members as considerably more angry and distressed in general, and in particular inferred more anger when they were misbehaving. This finding may reflect their (too heavy) reliance on their intact cognitive empathy skills. In fact, high CU adolescents generally report a high level of misbehavior and interpersonal conflicts (see the review Munoz & Frick, 2012), which may lead them to cognitively expect intense negative feelings in adults confronted to such a challenging and disruptive behavior. This proposition is comparable with Coyne's suggestion that repeated experiences of interpersonal rejection lead depressed individuals to develop a heightened sensitivity to negative interpersonal information (Coyne, 1976). High CU adolescents' overestimation of staff's negative emotions, in particular during misbehavior, could also result from an excessive reliance on their intact cognitive empathy skills, in compensation

for their impaired affective empathy. This theoretical interpretation has been confirmed by a recent functional neuroimaging study: In a facial emotion recognition task, high CU individuals showed a reduced responsiveness of the amygdala along with an extended brain activation in areas related to compensatory cognitive processes (Contreras-Rodríguez et al., 2014). Such compensation processes may be particularly mobilized in daily life interactions with familiar others where contextual cues abound, in contrast to computerized emotion recognition tasks which typically include very little context information. Evaluating affective sensitivity is complementary to examining empathic accuracy, the latter being more comparable with prior lab studies. Whereas examining accuracy eludes the incidence of under- or overestimating others' emotions, evaluating sensitivity offers these possibilities.

Another core difference between real-life interactions and computerized tasks is the predominance of the recognition of mixed sensory cues combined with interpersonal information, one's behavior and emotions in everyday life, while computerized emotion recognition tasks mostly use pure emotions. Mixed cues, as all ambiguous stimuli, are particularly susceptible to a confirmation bias typical of the human mind, in which the perception is distorted toward what is expected (Fisher, 1968). In high CU individuals, such common confirmation bias may be intensified by their overselective attention, an attention deficit in which one only attends to restricted aspects of complex stimuli. Overselective attention was first described in children with autism (Lovaas, Schreibman, Koegel, & Rehm, 1971) and has also been observed in individuals with psychopathic traits (Hiatt, Schmitt, & Newman, 2004). This may have increased the focus of our high CU adolescents on negative emotion cues in staff members during misbehavior, thus contributing to their overestimation of anger and distress. Yet, these explanations need to be confirmed in a future study using ecological stimuli, which would include mixed emotions and contextual cues in relevant situations.

LIMITATIONS

This novel ecological attempt to investigate the recognition of distress and anger by measuring empathic accuracy in natural situations nevertheless suffers from some limitations. First, the small number of staff reports and their imprecise synchronization with adolescents' reports could have restricted the power of our analyses of momentary associations between staff emotions and adolescents' perceptions. The present results would need to be confirmed and refined with an EMA design ensuring optimal synchronization between staff and adolescent data to reduce the risk of Type II error. This type of design would also enable the assessment of causal patterns between adolescents' perceptions, behavior, and emotions, which was not feasible in the current study given the irregular and often too lengthy intervals between staff reports.

Second, the present study lacks objective measures of staff's expressed emotions. Therefore, we cannot rule out the possibility that staff members did express more intense anger and distress when interacting with high CU adolescents but provided attenuated reports of these emotions due to social desirability. The fact that staff members did acknowledge feeling nonsignificantly angrier and significantly more distressed about these challenging adolescents is not suggestive of strong social desirability effects. In addition, the only study to date that investigated whether antisocial adolescents with high CU traits would elicit different emotional expressions compared with their low CU counterparts in their caregivers during an emotion communication task did not find such effects (Pasalich et al., 2012). This absence of effect contrasting with our observations may be due to the nonconfronting task

used by Pasalich and colleagues (i.e., a 10-min family discussion about past shared happy and sad moments), while we focused on real-life interactions over 8 days between institutionalized adolescents and staff members, which involves regular confrontation.

Third, the type of EMA design used in the current study measured empathic accuracy but did not explicitly measure empathy. Further research including the direct assessment of this construct is therefore necessary and should moreover differentiate between its affective and cognitive components, while maximizing both internal and ecological validity. Finally, a larger sample would be required to investigate gender differences.

CONCLUSION

To the best of our knowledge, this is the first study examining the transferability to daily life interactions of computerized task findings regarding the impaired distress recognition in adolescents with high CU traits. The novelty of this study lies in using EMA to measure empathic accuracy in this particular subgroup of adolescents, with unexpected results, albeit not necessarily contradicting the laboratory findings. When asked to repeatedly report on staff members' emotions, high CU adolescents were as accurate as their low CU peers in identifying anger and distress, suggesting that the EMA procedure helped them mobilize the attentional resources necessary for empathic accuracy toward the emotions in others. However, they substantially overestimated the intensity of negative emotions in familiar others during everyday interactions, possibly due to their overselective attention and/or their excessive reliance on cognitive empathy. This overestimation could undermine the development of supportive relationships and thereby contribute to maintain antisocial behavior, particularly in sight of their reduced sensitivity to punishment and strong reward orientation (Blair, Mitchell, Leonard, et al., 2004). These processes may also partially explain the observed limited influence of parenting quality on high CU children's behavior (Frick & Viding, 2009).

Taken together, these findings posit the overestimation of negative emotions' intensity as a key therapeutic target in high CU adolescents. This view is supported by recent evidence that empathic emotion recognition training across all emotions and modalities can significantly improve affective empathy and is ultimately effective for reducing problematic behaviors in children with high CU traits (Dadds, Cauchi, Wimalaweera, Hawes, & Brennan, 2012).

NOTES

1. Revisiting the role of impulsivity in conduct disorder: An ecological study of disruptive behaviors in incarcerated adolescents supported by the Swiss National Science Foundation (#100014-130553) and conducted under the supervision of the second author.

2. Only the Inventory of Callous-Unemotional Traits (ICU; Frick, 2004) provides a measure for CU traits. However, the Unemotional scale of the ICU, which may be particularly relevant for our study, has repeatedly shown poor internal consistency and criterion validity (Pihet et al., 2014). Correlations between the YPI-Int and YPI-Aff scales and the ICU total score are large (Pihet, Etter, et al., 2015).

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