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**Is it behavioral peer rejection or perceived rejection that predicts depressive symptoms  
in adolescence?**

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### **Abstract**

**Introduction:** Depressive symptoms increase during adolescence, especially in girls. Rejection from peers was found to be related to the development of depressive symptoms in adolescents. Nonverbal behaviors from peers but also more negative interpretations of facial expressions can lead to feelings of being rejected. A Social Skills Deficit Model for depression was tested investigating the predicting role of both rejection constructs as well as the concurrent role of having a bias in interpreting facial expressions.

**Methods:** Using longitudinal data collected in four waves, three analyses were conducted. First, the predictive value of subtle negative nonverbal behaviors of peers (behavioral rejection) for depressive symptoms was tested. Adolescents ( $N = 170$ ), without (mild) depression at wave 1, participated in videotaped conversation with a same-sex peer. Three (clusters of) nonverbal behaviors (negative facial expressions, discomfort, disinterest) were coded. Second, the concurrent value of perceived rejection for depressive symptoms was tested using a sample of participants ( $N = 576$ ) that included adolescents with (mild) depressive symptoms at the wave of the first measurement. Third, the predictive value of having an interpretation bias for emotional facial expressions (perceived rejection) for depressive symptoms in a sample of adolescents ( $N = 495$ ) was tested in a group without (mild) depression at the wave of the first measurement. Pictures of faces with different facial expressions were shown and participants had to indicate the level they perceived rejection.

**Results & Discussion:** Solely disinterest from peers seemed to predict depressive symptoms, but only when looking at boys and girls separately. However, for boys this effect was very small and only found for really high disinterest and for girls the subgroup that showed high disinterest was very small and might not have been representative. Perceived rejection was found to be significantly more displayed in girls. However, no concurrent or predictive link to depression was found. In this study mostly variance in depressive symptoms in the normative range was explained, so it is recommended to further investigate the possible predictive value for (mild) depression in the (sub)clinical range.

**Keywords:** Depressive Symptoms, Adolescence, (perceived) Rejection, Nonverbal Behavior

Depression is said to peak in mid-adolescence (Kessler, Avenevoli, & Ries Merikangas, 2001). This increase in depressive symptoms is stronger for girls than for boys (e.g., Beevers, Rohde, Stice, & Nolen-Hoeksema, 2007; Hankin et al., 1998). There are a number of factors (e.g., cognitive, biological, social) that might play a role in the increase of depressive symptoms in that time period. Due to the fact that in adolescence social relations to peers become increasingly important (Nylund, Bellmore, Nishina, & Graham, 2007), the focus of this study lays on social factors in explaining alleviated depressive symptoms. Social relations are additionally crucial for the development of the social self and the formation of identity (e.g., Nolan, Flynn, & Garber, 2003). As positive social relationships have been found to present a buffer against psychological stress (Cohen, Gottlieb, & Underwood, 2001), it only follows logically that negative social relationships lead to the opposite and increase the development of depressive symptoms (La Greca & Moore Harrison, 2010; Zwierzyńska, Wolke, & Lereya, 2013). These negative social relationships might be experienced through rejection. But what exactly goes awry in these interactions in order to experience or perceive rejection? Are there specific behaviors displayed or some interpretations of the situation made that lead to the experience of being rejected? The aim of the current study was to shed light on the construct of rejection in relation to depressive symptoms, with a specific focus on nonverbal behaviors of the peer and the way facial expressions are interpreted by the target.

In studies using questionnaires it was already found that peer rejection was related to, and predicted, depression in adolescents (Howes & Hokanson, 1979; Nolan et al., 2003). One model that might explain the relations between rejection and depression is the social skills deficit model (SSDM; Segrin, 2000). According to this model, individuals who display less optimal social skills are said to receive negative feedback, which might be shown in the form of rejection from others. This might lead to a cognitive bias and in turn could result in depressive symptoms. However, it still remains unclear what exactly goes awry in those

interactions and how negative feedback is shown. Therefore, it is necessary to analyse behaviors of the interaction partner, in order to get a better understanding of the mechanisms that might lead to depressive symptoms. Especially nonverbal behaviors are important to study, as those are known to function as information transmitters in regard to interpersonal relationships (Lakin, Jefferis, Cheng, & Chartrand, 2003; Riggo, 1992). Moreover, nonverbal behaviors are the behaviors individuals face during every social encounter and that occur even when people are not aware of them.

### **Subtle Behavioral Signs of Rejection**

In the present study, adolescents were recorded during social interactions. Due to the knowledge that they were being filmed, we assumed that they would not display obvious negative behaviors towards their interaction partners (e.g., aggression). Learning more about subtle negative behaviors, which might happen unconsciously, will also be important in regard to therapeutical interventions and the prevention of rejection between peers. If children are not aware that they engage in those behaviors, they cannot change them.

Next to gender differences in the development of depressive symptoms, the impact of rejection in relation to the development of depressive symptoms is expected to differ between boys and girls. For girls, relationships to peers are said to be more intimate in that time period and difficulties in social relationships have thus a greater impact on their well-being and identity development (Bank & Hansford, 2000). In terms of the SSDM (Segrin, 2000), it is known that, especially in girls, less gazing precedes the development of depressive symptoms (van Beek & Berg, 2019), and that for both genders more negative facial expressions (van Beek & Berg, 2015) and less smiling (van Beek, van Dolderen, & Dubas, 2006) were displayed towards mildly depressed adolescents. Therefore, the question arises of what comes first, rejection or depression. Thus, in the current study the question was investigated of

whether subtle negative behaviors are already present prior to the development of depressive symptoms and whether there will be a gender effect in our study in regard to the precedence of experiencing rejection for increases in depressive symptoms in a normative population.

### **Perceived Rejection**

However, it might be that the circle described in the SSDM does not start with negative feedback or less optimal social skills, but with a social-cognitive negative bias of the perception of being rejected. It was found that for those who develop depressive symptoms, social signals are more quickly interpreted in a negative manner (e.g., Gilbert, Irons, Olsen, Gilbert, & McEwan, 2006). Using questionnaires and experimental methods (e.g., auditory stimuli, scrambled sentences test, and ambiguous scenarios test), negative interpretation biases for social situations have already been shown to be related to depression in adults (Lawson, Macleod, & Hammond, 2002; Rude, Wenzlaff, Gibbs, Vane, & Whitney, 2002) as well as in adolescents (Orchard, Pass, & Reynolds, 2016). Moreover, rejection sensitivity, the tendency to overly perceive and expect rejection (Downey & Feldman, 1996) was, in line with the SSDM, already found to be co-occurring with and predictive of depressive symptoms in adolescents (e.g., Bondü, Sahyazici-Knaak, & Esser, 2017; Zimmer-Gembeck, Trevaskis, Nesdale, & Downey, 2014) in studies using questionnaires to assess rejection sensitivity. During social interactions, those perceptions of rejection are however most likely to occur while interpreting facial expressions of the interaction partner. Therefore, in this study as task was used in which the tendency to interpret facial expressions as signals of rejection was measured in order to assess perceptions of rejection of the target. As suggested by van Beek and Dubas (2008), the perception of anger was found to be concurrent to depressive symptom. Moreover, in girls anger was further related with perceiving less joy. Thus, anger can be regarded as an emotion that signals rejection. Thereof, the authors suggested to further study

perceived rejection in faces. The present research investigated this suggestion as it might be that also different facial expressions, that are neutral, positive, or are more blatantly negative, will be interpreted as rejective emotion signals. In terms of the SSDM it is still unanswered whether more negative interpretations of facial expressions co-occur or precede the development of depressive symptoms in adolescents. Moreover, as it was reported that girls attach more value to relationships (Gutman & Sameroff, 2004) and perceive negative interpersonal interactions as more stressful (Rudolph, 2002) the question emerged of whether also in our study a gender effect is present. Thus, this study aimed at exploring whether perceived rejection is co-occurring or preceding depressive symptoms and whether the link is especially prominent in girls.

### **Behavioral and/or Perceived Rejection?**

The two aforementioned factors, real rejection and perceived rejection, might however not be exclusive but could also occur together. In a study done by Downey, Lebolt, Rincon, and Freitas (1998), using questionnaires to assess rejection sensitivity, it was found that children with high rejection expectations became more distressed after having experienced an experimentally induced rejection than those children low in rejection expectations. Thus, the question arises whether this might also occur when looking at subtle negative behaviors of interaction partners instead of experimentally induced rejection and when measuring the tendency of interpreting rejection in facial expressions instead of answering a questionnaire. In contrast, also the other way around, might be possible. Namely, people that experience rejection could develop heightened sensitivity to other rejection signals (e.g., facial expressions) and the occurrence of both might then lead to depressive symptoms (Segrin, 2000). The present data does not allow yet to examine how these two measures influence each other. However, we expected, as predicted by the SSDM (Segrin, 2000), that both forms of

rejection will precede as well as co-occur with depression. The question of whether both factors will precede the development of depressive symptoms will be answered by means of the first two hypotheses. If no predictive relationships will be found it is more likely that depression is causing subtle negative nonverbal behaviors from peers and perceived rejection.

### **This Study**

Taken together, this study had the aims to 1) investigate whether behavioral rejection from peers in terms of subtle negative nonverbal behaviors predicts variances in depressive symptoms of the target participant in later waves. Moreover, this study aimed to answer the question of 2) whether perceived rejection, in terms of interpreting rejection in facial expressions, co-occurs with and/or predicts the occurrence of depressive symptoms in adolescents in later waves. Both questions were investigated by means of a longitudinal study in which students have been followed over a period of nearly three years in which measurements took place four times, each about nine month apart. It was expected that more subtle negative behaviors in wave 1 from the peer led to more increases in depressive symptoms in the target in later waves, especially in girls. Additionally, girls were expected to perceive higher levels of rejection than males and that those that show higher levels of perceived rejection also display higher depressive symptoms at the same wave. Moreover it was hypothesized that if higher levels of perceived rejection are seen it predicted depressive symptoms in later waves, more so in girls than boys.

## **Methods**

### **Participants**

For the main analyses different subsamples from a larger sample ( $N = 606$ ) of Dutch students from two secondary schools located in several cities in the central part of the Netherlands

were used (see van van Beek et al., 2006 & 2008). For answering the first hypothesis, regarding behavioral rejection, the sample consisted of 170 participants who were not showing (sub)clinical levels of depressive symptoms at wave 1, of which 82 participants were female (48.2%), with a mean age in the whole subsample of 14.60 years ( $SD_{age} = 1.01$ ). For the second analysis regarding perceived rejection the sample for the concurrent analysis consisted of 576 participants of which 303 were female (52.6%), with a mean age of 14.87 years ( $SD_{age} = 1.11$ ). For this subsample, participants with (sub)clinical levels of depressive symptoms at wave 1 were included. For the predictive analysis 495 participants, who were not yet showing depressive symptoms in the wave in which their depressive score was measured first, were included in the analyses, with 250 females (50.5%). The mean age in this subsample was 14.88 years ( $SD_{age} = 1.13$ ).

## Design

The participants were followed over a period of 2.5 years. In this period, there were four measurement points with an interval of nine month. At each measurement point a variety of questionnaires were administered and about a third of the participants also participated in the observation study (see *Observations*).

## Instruments

**Depression inventory.** Depressive symptoms were measured with a Dutch version (van Beek, Hessen, Hutteman, Verhulp, & van Leuven, 2012) of the Children's Inventory (Kovacs, 1992). The questionnaire consists of 28 items, each with three answer categories. The participants had to select which answer applies to them best in the last weeks. Each answer for an item could be converted to  $0 = non-depressive$ ,  $1 = mildly depressive$ , and  $2 = more clearly depressive$ . The items concerned the mood, motivation, and self-image of the



child. Reliability in the current study was good with Cronbach's alpha between  $\alpha = .83$  and  $.90$ , which is in line with previous studies ( $\alpha = .81$ ; Van Beek, Hessen, Hutteman, Verhulp, & Van Leuven, 2012). As the aim of the study was to predict depression in later waves for both hypotheses regarding the predictive value of either of the rejection measures, the highest score of waves two to four was used as the participants' final dependent variable ("highest CDI"). This was deemed more suitable than calculating the mean score from all four waves as depression is episodic, thus using the total mean could lead to lower overall scores that may not reflect reality. For the analyses of the concurrent value of perceived rejection the CDI score of the wave in which the depression score was measured first ("first CDI") was regarded as the dependent variable. Here participants were also included that missed wave 1 but entered in wave 2 or 3, then the depression score of their respective first wave was used.

**Observations.** Conversations between participants were videotaped for five minutes. Conversation partners were of the same gender and educational level. In order to control for the quality of relationships in regard to the conversation, the conversation partners were seldom classmates, and if they were, they were no friends. They were instructed to discuss a social dilemma until they reached a best possible solution. When the participants agreed on a solution, they were asked to make a top-5 of diverse themes, as for example their favorite subjects, until they talked for about five minutes. The participants were not aware that their nonverbal behavior was coded during the conversations. The videos were coded by trained coders. The students that analyzed the videos were unaware of the depression score of the participant during analyses of the video-recordings.

The following behaviors were observed in both partners in communication. Reliability between raters and validity of the behaviors was established (see van Beek & Berg, 2019). For the current study, we were only interested in the behaviors of the partner.

*Subtle Negative Responses*

- Negative facial expressions: Measured through coding of facial expressions which are suggesting contempt, rejection, and dissatisfaction as for example, frowning or yawning. Behaviors were coded on a 5-point Likert-scale from *1 = not or barely present* to *5 = often present*. In the following this variable was called “Negative Facial Expressions”.
- Disinterested behavior and posture: Signs of boredom in movements (e.g., shrugging of shoulders) or in body posture (e.g., avert from the conversation partner), and monotone voice. Those three behaviors were coded on a 5-point Likert-scale from *1 = not or barely present* to *5 = often present*. The average of those three variables built the variable “Disinterest”.
- Discomfort: measured by coding the following behaviors; unsettled face (e.g., biting on lips or cheek), stiff posture, big posture movements, and defensive posture (e.g., arms pressed to body) indicating restlessness. Those four behaviors were coded on a 5-point Likert-scale from *1 = not or barely present* to *5 = often present*. The average of those four scores made up the variable “Discomfort”.

**Perceived rejection in facial expressions.** To measure the tendency of interpreting facial expressions as signs of rejection, children were presented with schematic drawings of faces known to vary in intensity and ambiguity (Bouhuys, Geerts, & Gordijn, 1998; Hale, Jansen, Bouhuys, & Van Den Hoofdakker, 1998) in adult studies. In a previous study done by van Beek & Dubas (2008) faces were adapted for the use with children (e.g., rounder shape of head). For this study the number of low intensity faces was extended and faces of boys and girls were generated by differences in hair (see Appendix 1), resulting in a total of 30 different faces. Six faces, those that did not contain negative signals, were deleted when calculating the

average of the perceived rejection score in order to increase the reliability score to  $\alpha = .776$ . Participants were asked how much the person in the picture (dis)liked them. With this acceptance/rejection was measured. Scores on this measure ranged from -3 to 3, with more negative scores indicating that the face was perceived as more rejecting.

### **Statistical Analyses**

Analyses were done with SPSS software (Version 25; IBM Corp. released 2017). Preliminary assumptions (normality, homoscedasticity, linearity, etc.) were checked prior to analyses for all variables that were included in the hierarchical regression analyses. The main variable for the two predictive analyses “highest CDI” violated the assumptions of normality and homoscedasticity of residuals. Therefore, a log transformation was applied to the dependent variable (“highest CDI”) to overcome those deviations. Also for the analysis of the concurrent value of perceived rejection the dependent variable “first CDI” showed deviations from normality and was thus transformed. Analyses were done with the log transformed dependent variables.

To examine (1) whether real rejection precedes depressive symptoms, those participants that did not show depressive symptoms in wave 1 (CDI score of 12 or below) were selected. For those participants we checked whether rejection from the interaction partner in terms of nonverbal behaviors in wave 1 predicted an increase in depressive scores in the later waves. Same was done with the second subsample to (2) answer the second research question regarding whether perceived rejection is predicting depressive symptoms in later waves. For both hypotheses (1 and 2) hierarchical regression analyses were run controlling for age, first CDI score, and gender. For the analysis regarding the concurrent value of perceived rejection CDI scores above 12 were included (81 participants (14.1%) already reached (sub) clinical levels of depressive symptoms at their first measurement point). A regression analysis was

run with “first CDI” as the dependent variable. We controlled for age and gender. For all analyses it was also checked, by running moderation analyses per subsample, whether gender had an effect on the relationship between either subtle negative behavior and depression or perceived rejection and depression.

## Results

### Descriptives

Descriptives and gender differences of the predictor variables “Negative Facial Expressions”, “Discomfort”, “Disinterest”, and “Perceived Rejection” (concurrent and predictive sample) are displayed in Table 1.

Table 1

*Descriptives and Mean Differences for the Predictor Variables per Gender.*

Predictor	<i>total</i>	<i>male</i>			<i>female</i>			<i>z</i> -test
	<i>N</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	
<i>Negative Facial Expression</i>	170	88	3.34	1.47	82	2.72	1.50	-2.594*
<i>Discomfort</i>	170	88	1.79	0.51	82	1.75	0.64	-1.150
<i>Disinterest</i>	170	88	1.81	0.61	82	1.42	0.47	-4.296**
<i>Perceived Rejection</i>								
Concurrent Sample	576	273	-0.97	0.43	303	-1.16	0.45	-5.937**
Predictive Sample	495	245	-0.98	0.40	250	-1.14	0.46	-5.149**

\* $p < .05$ , \*\*  $p < .001$ .

A Mann-Whitney test indicated that negative facial expressions ( $z = -2.594$ ,  $p = .009$ ) and disinterest ( $z = -4.296$ ,  $p < .000$ ) were significantly more frequent displayed by male than female peers. Also perceived rejection was significantly different between males and females in the concurrent sample ( $z = -5.937$ ,  $p < .000$ ) as well as in the predictive sample ( $z = -5.149$ ,  $p < .000$ ). In both samples girls showed more perceived rejection (i.e. a more negative mean) than males.

For the behavioral rejection predictors more detailed descriptives, showing the distribution of scores for the predictor variables per gender, are displayed in Table 2.

Table 2

*Distribution of Scores for the Predictor Variables for Behavioral Rejection Predictors by Gender.*

	<i>N</i>	Not or barely present ( <i>N</i> (%))	Sometimes present ( <i>N</i> (%))	Often present ( <i>N</i> (%))
<b>Total</b>				
<i>Negative Facial Expressions</i>	170	32 (18.8)	44 (25.9)	94 (55.3)
<i>Discomfort</i>	170	20 (11.8)	105 (61.8)	45 (26.6)
<i>Disinterest</i>	170	54 (31.8)	85 (50)	31 (18.2)
<b>Male</b>				
<i>Negative Facial Expressions</i>	88	11 (12.5)	21 (23.9)	56 (63.7)
<i>Discomfort</i>	88	8 (9.1)	52 (59.2)	28 (31.8)
<i>Disinterest</i>	88	19 (21.6)	45 (51.2)	24 (27.2)
<b>Female</b>				
<i>Negative Facial Expressions</i>	82	21 (25.6)	23 (28.6)	38 (46.4)
<i>Discomfort</i>	82	12 (14.6)	53 (64.6)	17 (20.6)
<i>Disinterest</i>	82	35 (42.7)	40 (48.7)	7 (8.5)

*Note.* Not or barely present = Number of participants with score 1; Sometimes present = Number of participants with score 2 ; Often present = Number of participants with scores 3 or higher.

## Main Analyses

**Predictive value of behavioral rejection of peers for depressive symptoms.** To investigate the predictive value of negative behavioral responses from the peer for the development of later highest depression score, separate regression analyses per negative behavior were run including only participants that were not mildly depressed at wave 1 ( $CDI \leq 12$ ). One new variable was entered at each block of the regression. None of those regression analyses were significant. Thus, none of the three predictor variables significantly explained variance in the depressive score at later waves.

Investigating a possible effect of gender on this relation, three moderation analyses were run for each of the subtle negative behaviors. Only for disinterest from the peer, a significant interaction effect with gender was found (see Table 3). Each of the other behavioral predictors and their gender interactions were not significant.

Table 3

*Summary of the Hierarchical Regression Analysis for Disinterest.*

Predictor	Disinterest	
	$\Delta R^2$	$\beta$
Step 1	.156**	
First CDI		.395**
Step 2	.017	
First CDI		.413**
Age		-.130
Step 3	.007	
First CDI		.417**
Age		-.139
Gender		.083
Step 4	.004	
First CDI		.424**
Age		-.151*
Gender		.062
Disinterest		.065
Step 5	.047*	
First CDI		.409**
Age		-.189*
Gender		-.600*
Disinterest		-.241*
Gender x Disinterest		.853*

*Note:*  $N = 170$ , Dependent variable: "highest CDI", \* $p < .05$ , \*\* $p < .001$ .

Thus, gender seemed to moderate the relation between disinterest and depressive symptoms.

In order to better understand the interaction between gender and disinterest, an ad hoc analysis with separate regression analyses per gender (see Table 4) was conducted.

Table 4

*Hierarchical Regression for the Predictive Value of Disinterest for Depressive Symptoms per Gender.*

Predictor	male		female	
	$\Delta R^2$	$\beta$	$\Delta R^2$	$\beta$
Step 1	.177**		.138*	
First CDI		.421**		.371*
Step 2	.011		.030	
First CDI		.440**		.389**
Age		-.109		-.174
Step 3	.060*		.046*	
First CDI		.462**		.351*
Age		-.207*		-.179
Disinterest		.263*		-.218*
<i>N</i>	88		82	

Note. Dependent variable: "highest CDI", \* $p < .05$ , \*\*  $p < .001$ .

For boys, when adding disinterest to the model an addition of 6% of variance in predicting depressive scores in later waves was explained (see Table 4). More disinterest from the peer seemed to lead to *higher* depressive scores for boys. For girls, the picture was different. An additional 4.6% of variance in depressive scores was explained by adding disinterest to the model. Higher disinterest from the peer seemed to result in *lower* depressive scores. However, high scores of disinterest were only shown in 8.5% of the girls (see Table 2).

#### **Concurrent relationship between perceived rejection and depressive symptoms.**

For the concurrent analysis a regression model with similar steps as in the regression analyses above was run. Cases with a CDI score above 12 (see *Methods* for details) were included in this sample. No significant main effect of perceived rejection ( $F(1, 572) = 1.287, p = .257$ ) and no significant interaction with gender ( $F(1, 571) = 1.744, p = .187$ ) was found. Therefore, also when already including (mildly) depressed participants, perceived rejection did not explain variance in depressive symptoms.

**Predictive value of perceived rejection on depressive symptoms.** To investigate the predictive value of perceived rejection for the development of later highest depression, a similar hierarchical regression analysis as for behavioral rejection was run with perceived rejection as the independent variable. There was no effect of perceived rejection when controlling for age, gender, and first measured CDI ( $F(1, 490) = 0.008, p = .928$ ). Thus, perceived rejection does not seem to have a predictive value for later depressive symptoms. When adding the interaction term between gender and perceived rejection, also no significant moderation effect of gender in the prediction of depressive symptoms was found ( $F(1, 489) = 2.293, p = .131$ ). Concluding, there seems to be neither a predictive, nor a concurrent value of perceived rejection on depressive symptoms.

## Discussion

This study had the aims to examine the role of subtle negative behaviors of the peer partner (behavioral rejection) and more negative interpretations of emotional facial expression of the target (perceived rejection) in relation to (the development of) depressive symptoms in adolescence. Based on the SSDM model (Segrin, 2000) we expected to find both concurrent and predictive relationships for both rejection measures, particularly in girls as for them social relations during this period seem especially influential (Bank & Hansford, 2000).

### The Predictive Value of Subtle Negative Behaviors for Depressive Symptoms

Gender differences were found for the display of negative facial expressions and disinterest by peers, with both being shown significantly more in male peers than female peers. These findings were to be expected given the gender display rules (DePaulo, 1992; van Beek et al., 2006). These pose that girls should behave more friendly and other-oriented whereas in boys the display of negative behaviors is more accepted. The concurrent



relationship between subtle negative behaviors and (sub)clinical levels of depressive symptoms was already established (see van Beek & Berg, 2015), thus only predictive analyses were performed. Only for disinterest and when looking at the genders separately, the hypothesis of a predictive value of subtle negative behaviors for depression could be accepted. Disinterest seemed to be predictive of increases in depressive symptoms in boys, especially for very high values of disinterest. Also other studies using questionnaires found some indications for the role of rejection for depression in boys (Fussner, Luebbe, Mancini, & Becker, 2018; Reinherz, Giaconia, Carmola Hauf, Wasserman, & Paradis, 2000). Thus, according to the SSDM it seems that for boys, negative behaviors from peers in the form of disinterest are already shown prior to increases in depressive symptoms. However, the low explained variance in our study has to be noted (6%; see Table 4) which implies that future research should investigate whether there is a reliable gender effect present by using a larger sample and predicting (sub)clinical depression scores.

As it was previously found that girls react more sensitive to rejection (Bank & Hansford, 2000) and that this had effects on mood and identity development which in turn led to increases in depressive symptoms, it was also expected in our study that girls will show higher levels of depressive symptoms when experiencing rejection. The current study however found contrary results to expectations as disinterest seemed to predict decreases in depressive symptoms in girls. These results might be explained by the fact that there was only a small subgroup of girls showing high disinterest (8.5%; see Table 2) and those happened to have a conversation partner of the very large proportion of girls showing low CDI scores. Thus, these findings might be misleading. A further explanation might be that the target displayed specific behaviors which might protect against the development of depression. Thus, these signs of rejection should be studied in future research in relation to target behavior (as in van Beek and Berg, 2019).

To conclude, only very limited links were found between peer behavior and later target depression development. It might be that in contrast to gazing, which is a behavior that is always present and therefore resulted in high power in an observation of five minutes, more negative behaviors might not occur frequent enough in a five minute observation and thus might lead to low power (see Turkstra, Ciccio, & Seaton, 2006). Future research should study longer and more diverse real life conversations. Furthermore, it might be that less optimal communication gradually builds up. This would imply that the cycle proposed in the SSDM (Segrin, 2000) might start with very subtle behaviors as gazing, but that when time proceeds the behaviors become more negative, especially when depressive symptoms increase. As mentioned before, it is known that, especially for girls, gazing predicts depressive symptoms (van Beek & Berg, 2015) and that mildly depressed adolescents (both boys and girls) received less smiling and more negative facial expressions (van Beek & Berg, 2015; van Beek et al., 2006). Thus, it might be that the subtle negative behaviors that were studied in our research only precede (sub)clinical levels of depressive symptoms and do not explain variance in the normal range.

### **The Relationship Between Perceived Rejection and Depressive Symptoms**

Both hypotheses, regarding (1) the concurrent value of perceived rejection and (2) the precedence of a tendency for more negative interpretation of social signals to increases in depressive symptoms, could not be accepted. However, it was found that girls displayed significantly greater levels of perceived rejection than boys. This is in line with existing literature. Girls were found to be more reactive to peer related stressors than boys (Hankin, Mermelstein, & Roesch, 2007) which might be because they put a greater value to peer relationships (Rudolph, 2002). Also Downey et al. (1998) reported that those children that show heightened rejection sensitivity experience more distress. Rejection sensitivity was

previously found to be co-occurring but also predictive for the development of depressive symptoms in the (sub)clinical range (Bondü et al., 2017; Marston, Hare, & Allen, 2010). However, rejection sensitivity was previously measured by means of questionnaires and interpreting hypothetical situations. Thus the measure of the current study would add to this understanding as it is a reliable and interesting measure because of its link with daily (unconscious) processing of emotional cues. However, this study could not offer support for the SSDM (Segrin, 2000) as no relationship with depressive symptoms, concurrently nor predictive, was found. A reason for our findings might be that a sample of the normative population was used. As there seems to be a concurrent as well as predictive link between perceived rejection and depressive symptoms in other studies, our hypothesis should be investigated in future research, with using the current perceived rejection measure, in larger samples predicting (sub)clinical levels of depression instead of highest depression score.

### **Strengths and Limitations of the Current Study**

Strengths of the current study are for one its longitudinal design which allowed not only to investigate concurrent effects of behavioral and perceived rejection in regard to depressive symptoms but also their predicting roles. Moreover, the usage of an emotional facial expression task adds to the lack in literature of having a reliable measure for perceived rejection. It is recommended to extent this measure for the interpretation of other nonverbal signs as participants are not aware of what is being measured which lowers the affect of social desirability.

However, there are also some limitations that are worth mentioning. As mentioned previously, some behaviors might not occur as frequent and are thus not that often visible in a five minute sequence. That does not imply that there is no link between those behaviors and depressive symptoms in real life social interactions, but that our study might not has

realistically captured those behaviors. Therefore, future research should analyze longer frequencies so that it can be assured that behaviors are correctly measured and analyzed. Secondly, in regard to the coding of the subtle negative nonverbal behaviors the generalizability of our results has to be questioned. Even though the participants were not aware during the study of the exact purpose (e.g., observing nonverbal behaviors), the whole set-up was still a staged scenario and social encounters in real life might result in the display of more extreme behaviors. Thirdly, separate regression analyses were run per negative behavior. It might be that negative behaviors add up and together show an effect. Thus future research should also take the added value of the negative behaviors into consideration. Additionally, also other life stressors (e.g., parent's divorce, puberty) could pose risk factors for the development of depressive symptoms. These might add up with rejection leading in the combination to increases in depressive symptoms. Studies are necessary to include also other life stressors that are important during the time period of adolescence in order to get a better understanding of the factors that play a role in influencing depressive symptoms. Moreover, the question regarding the relationship of the two rejection measures is still open. Namely, whether behavioral rejection precedes perceived rejection or the other way around (e.g., Downey et al., 1998; Segrin, 2000). The current findings suggest that in a normative sample none of the two rejection measures precedes depressive symptoms. The present sample was too small to investigate concurrent or predictive relationships between the two measures. Thus, further research should study the longitudinal relationship between behavioral and perceived rejection in a larger sample in order to determine what comes first.

Taken together, the current study aimed to explore the predictive value of behavioral rejection by peers and the concurrent and predictive value of perceived rejection for depressive symptoms, particularly in girls. Not much evidence for the suggested SSDM could be found.

Given the normative sample (and other described limitations), future studies are necessary to investigate possible links with (sub)clinical levels of depression, as previous research suggests that they might exist (e.g., Bondü et al., 2017; Segrin, 2000; van Beek & Berg, 2015). This will help to fully understand the value of rejection for the development of depressive symptoms and to create and implement interventions that reduce rejection behaviors in adolescents and/or reduce social-cognitive negative biases of the perception of being rejected.

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## Appendix A

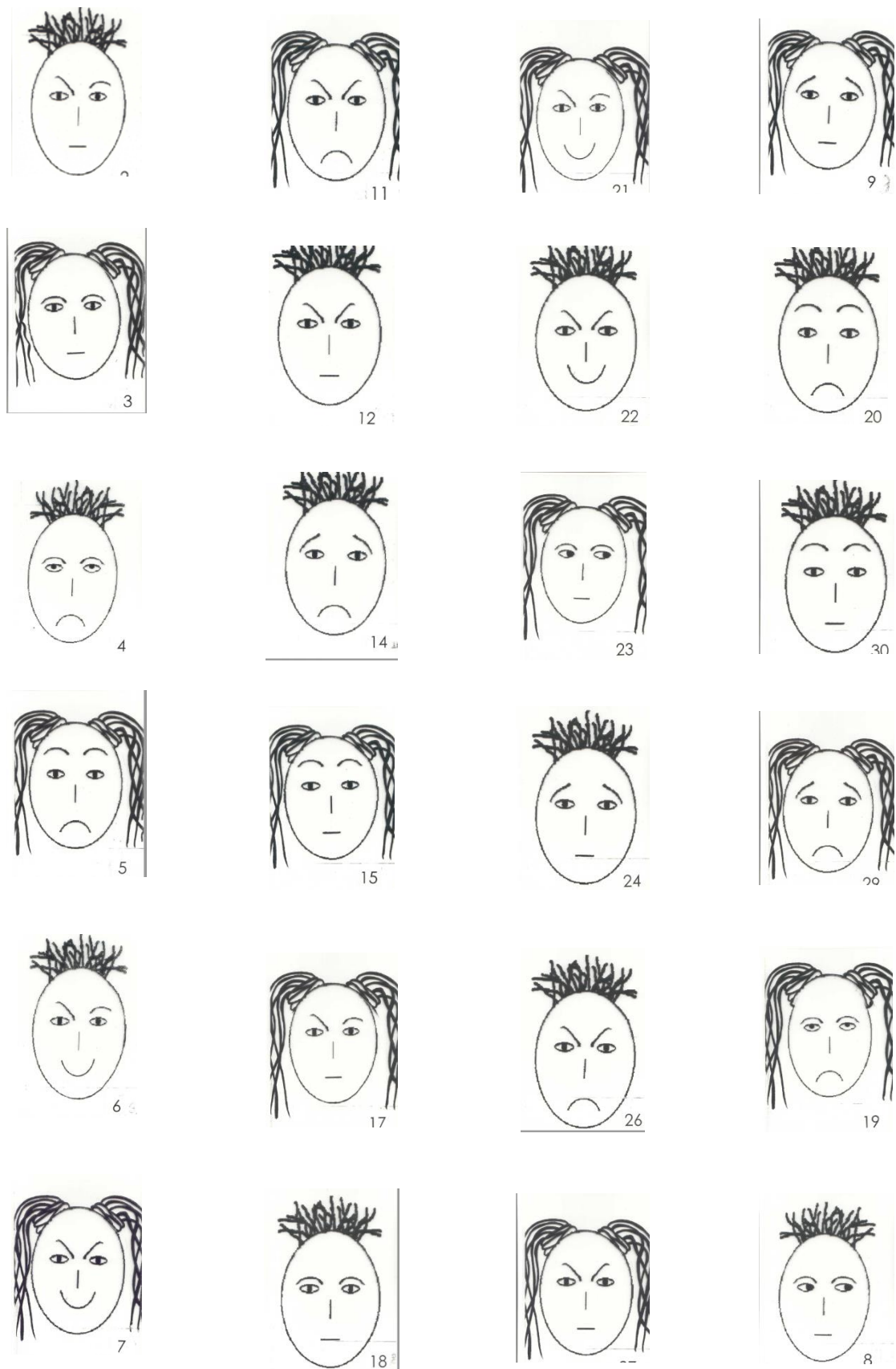


Figure 1. Faces used for the perceived rejection measure.