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Exploring potential differential relationships between social anxiety and emotional eating amongst normative vs. academically gifted students

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ABSTRACT

The social environment, which plays a critical role, is an important factor for self-development during adolescence. On the other hand, gifted adolescents may be relatively at risk in social relationships. Therefore, the first objective of the current research is to examine the relationship between social anxiety and emotional eating in normative adolescents. The second objective is to examine whether this relationship would be different for academically gifted adolescents. For both groups, three constructs of social anxiety were examined: fear of negative evaluation, social avoidance and distress for new or unfamiliar situations, and social avoidance and distress for general situations. In total, 429 Dutch high school students completed measures of emotional eating and social anxiety (normative = 246, gifted = 83). The results from a confirmatory factor analysis showed that for normative adolescents only fear of negative evaluation was positively related to emotional eating ($p < .001$). For academically gifted adolescents, there were no significant relationships between any of the three constructs of social anxiety and emotional eating. Results and implications for future research directions are discussed. Future research projects would benefit from the exploration and addition of coping mechanisms to such studies. This could allow researchers to investigate the potential mediational effects of coping strategies between anxiety and emotional eating in these two groups.

KEYWORDS

Social anxiety; emotional eating; adolescence; giftedness

Introduction

Adolescence is a transition period in which interaction with and validation from peers become extremely important for one's self-development and characterized by an increase in importance of peer relationships (Furman & Buhrmester, 1992; La Greca & Harrison, 2005). Adolescents develop their social skills, feelings of personal competence, identity, and independence through these social interactions with peers (Furman & Buhrmester, 1992; La Greca & Harrison, 2005). As the importance of the social environment and peer networks grows, anxiety around being personally evaluated can increase (La Greca & Harrison, 2005, 2010). Therefore, social anxiety may be a critical predictor for understanding adolescents' social relationships and wellbeing.

Social anxiety can be described as feeling uncomfortable and experiencing uneasiness in either imagined or actual social settings (Schlenker & Leary, 1982). Originally, Watson and Friend (1969) divided

social anxiety into two components: fear of negative evaluation by others (FNE) and social avoidance and distress (SAD). FNE is defined as either the *distress* resulting from the possibility of being negatively evaluated, the *avoidance* of situations where one might be evaluated, or the *expectation* of negative evaluation by others. SAD is defined as the experienced *distress* and therefore actively avoiding, or having the desire to avoid a social situation. Whereas FNE is limited to the cognitive aspect of social anxiety, SAD involves somatic, affective, as well as, cognitive aspects (Watson & Friend, 1969). Additionally, SAD contains two sub-scales: SAD-general; characterized as social avoidance and distress for general situations, and SAD-new; Social Avoidance and Distress in New Situations.

Emotional eating

Socially anxious adolescents may employ different coping strategies when dealing with negative

emotions concerning social situations. Coping strategies toward stressors can vary from behavioral disengagement, problem solving, searching for social support, and self-distraction. All of these strategies are accompanied by differing behaviors, for example, behavioral disengagement could lead to less effort in seeking social situations or problem solving that could lead to actively looking for help in dealing with awkward social feelings. Etkin et al. (2016) report that social anxiety explains the relationship between shyness and preference for solitude, and emotional eating in adolescents.

Overeating is an example of self-distraction coping strategy which aims to manage the emotional distress arising because of the problem (Czaja et al., 2009; Fox et al., 2016; Kohlboeck et al., 2013). Emotional eating in order to self-distract from feelings of distress may seem like a harmless coping strategy, but for vulnerable adolescents (Compas et al., 1993), this behavior increases the risk for developing obesity (Cali & Caprio, 2008; Kohlboeck et al., 2013; Quak et al., 2008).

Researchers have demonstrated that disturbed eating behavior is a widely used self-distracting coping mechanism for social anxiety (Fitzsimmons & Bardone-Cone, 2011; Ostrovsky et al., 2013). Wonderlich-Tierney and Vander Wal (2010) also found that FNE is significantly correlated with eating disorder symptoms in university students. However, were not significantly related to disturbed eating behavior (Wonderlich-Tierney & Vander Wal, 2010). In Women, higher reported levels of FNE were positively significantly related to disturbed eating patterns (Gilbert & Meyer, 2005). That is, women who scored high on FNE had a stronger drive for thinness and engaged more often in restrictive eating. Equally, for young adolescent girls, Vander Wal et al. (2008) report that higher levels for FNE were linked to higher levels of body dissatisfaction and disturbed eating attitudes and behaviors.

Social anxiety disorder (SAD) has a high comorbidity with eating disorders that has been well established (Godart et al., 2000; Pallister & Waller, 2008). Moreover, SAD has also been reported as the highest occurring anxiety disorder for people with eating disorders (Levinson & Rodebaugh, 2012). Individuals with SAD, the anxiety stems fear surrounding different types of occurrences: fear of social interactions, fear of scrutiny, and fear of

both positive and negative evaluation (Levinson and Rodebaugh (2012). Generalized feelings of anxiety as well as, anxiety or nervousness in social situations and/or peer rejection has been suggested to be trigger for emotional eating (Vandewalle et al., 2017).

Giftedness and social anxiety

Academically gifted students are typically described as students whose intelligence score is significantly above than average and their school performance is superior to their peers. Due to these characteristics, gifted students are generally seen as to be vulnerable to several social difficulties (Blaas, 2014; Rimm, 2003). However, there is an active ongoing debate in the academic literature that either characterizes gifted students as harmonious or disharmonious in comparison to their normative peers. In this harmony-disharmony debate surrounding giftedness, researchers discuss two conflicting views on the wellbeing of gifted children.

The disharmony theory asserts that academically gifted children are more vulnerable to difficulties in social and emotional domains compared to their normative peers. Researchers substantiate this theory by arguing that academically gifted children encounter difficulties due to the experience of and sensitivity to social conflicts and not fitting in because of their advanced cognitive capabilities (Manaster & Powell, 1983; Neihart, 1999). Additionally, gifted students may experience social isolation and externalizing problems such as anxiety (Blaas, 2014; Rimm, 2003). Tong and Yewchuk (1996) reported that the academically gifted students reported higher levels of anxiety compared to normative peers. Additionally, Summerfeldt et al. (2006) found that emotionally intelligent students, in terms of their ability to understand, monitor, and discriminate between their own and other's emotions, reported more social anxiety in comparison to students who are less emotionally intelligent.

On the other hand, harmony theory asserts that academically gifted children adjust adequately within social and emotional domains, and if anything, excel compared to their normative peers in terms of intellectuality, but also in areas such as emotional wellbeing and social adaptation (Baker, 1995; Baudson, 2016; Godor & Szymanski, 2017;

Metha & McWhirter, 1997; Richards et al., 2003; Terman, 1925). Additionally, Godor and Szymanski (2017) found that academically gifted adolescents do not differ from their peers on the majority of comparisons within the construct of sense of belonging at school and where differences were found, gifted students reported significantly higher levels of these concepts compared to their normative peers.

Giftedness and emotional eating

Specifically for emotional eating, researchers have reported that intelligence is negatively correlated to the amount of emotion-focused coping. In other words, adolescents with higher intelligence report lower levels of emotion-focused coping in comparison to their normative peers (Coleman, 1992; Preuss & Dubow, 2004). Moreover, higher IQ has been reported to lead to different coping strategies with stress and anxiety (Coleman, 1992; Preuss & Dubow, 2004). Academically gifted children generally choose more effective problem-focused coping strategies compared to their normative peers

Besides different coping strategies related to IQ, Chandola et al. (2006) report a negative relationship between IQ and BMI over one's lifetime. It could be argued that IQ acts as a protective factor for weight gain later in life. Equally, lower IQ scores were correlated with obesity and weight gain in adulthood (Chandola et al., 2006). The role of BMI in predicting emotional overeating in young children has been shown to be bi-directional (Derks et al., 2018) "indicating that emotional overeating was both a predictor and a consequence of a relatively high BMI (p. 5)."

Taken together, this research aims to assess whether normative and gifted adolescents differ in levels of emotional eating in relation to their perception of social anxiety. To contribute to the knowledge concerning the emotional wellbeing in adolescents and academically gifted adolescents, it is not only important to distinguish between different constructs of emotional wellbeing, but also to investigate possible coping strategies, in this case: emotional eating. Therefore, in the current research two research questions guided this project:

Question #1: Are there mean differences for the three social anxiety constructs between normative and gifted students?

Question #2: does the relationship between social anxiety and emotional eating differ between academically gifted and normative adolescents?

In order to best test these hypotheses, structural equation modeling (SEM) will be used to first confirm (CFA) that the concepts of social anxiety and emotional eating are configural, metric and scalar invariant between the two groups. After performing confirmatory factor analyses for the two scales and establishing invariance, latent mean scores will be calculated and tested for significant differences in order to answer question #1. To answer question #2, a path analysis will be performed to test the hypothesized model in SEM and regression weights will be then tested for significant differences.

Methods

Participants and procedure

In total, 429 adolescents participated in the current research. All participants attended one high school in The Netherlands. Of the participants, 83 were academically gifted and 346 were normative. National Examinations in the Netherlands is a central examination that serves to quantify academic levels of entering high-schoolers. Students in the research who were labeled as "academically gifted" scored in the upper two percent of their national examinations. Parental written consent was obtained prior to the distribution of the questionnaire and the used scales were contained in a larger survey.

Instruments

The Social Anxiety Scale for Adolescents: The Social Anxiety Scale for Adolescents (SAS-A; La Greca & Stone, 1993; Inderbitzen-Nolan & Walters, 2000) was used in the current research to measure participants' social anxiety level. The SAS-A is a three-factor self-report questionnaire that consists of 22 items. Participants indicated how much each item describes them on a five-point scale (1 = *not at all*, 5 = *all the*

time). Total scores can range from 18 to 90. Scores above 50 are taken as a marker for clinically significant social anxiety (La Greca & Stone, 1993). This scale has three subscales: fear of negative evaluation by peers (FNE, eight items; “I worry about what others think of me”), social avoidance and distress for new situations or unfamiliar peers (SAD-new; six items; “I get nervous when I meet new people”), and social avoidance and distress for general situations with peers (SAD-general; four items; “I feel shy even with people I know well”). The remaining four items are filler items. A higher score indicates a higher amount of reported anxiety (La Greca & Stone, 1993). Psychometric support for the SAS-A has been satisfactory (La Greca & Stone, 1993; Inderbitzen-Nolan & Walters, 2000). Reliability coefficients are .89 for FNE, .80 for SAD-new and .70 for SAD-general (Inderbitzen-Nolan & Walters, 2000).

The Three Factor Eating Questionnaire: A part of the Three Factor Eating Questionnaire – R18V2 (TFEQ-R18V2; Cappelleri et al., 2009; Martín-García et al., 2016) was used in the current research to measure emotional eating. In total, this self-report questionnaire consists of 18 items rated on a four-point scale (1 = *not true*, 4 = *always true*). The questionnaire has three subscales: Uncontrolled Eating, Emotional Eating, and Cognitive Restraint. In the current research, the six items from the Emotional Eating subscale were used. An example of a question is “I start to eat when I feel anxious”. A high score indicates more emotional eating. Psychometric support for the Emotional Eating subscale has been satisfactory with a reliability coefficient of .92 (Cappelleri et al., 2009; Martín-García et al., 2016).

Procedure

The data collection tools were administered in one session in the spring of 2017. Participants and their parents received information about the research, which inferred consent and had an opt-out option. All questionnaires were completed anonymously. Participants filled the questionnaires in their regular classroom setting and by themselves.

Statistical analyses

The data were checked for outliers and implausible scores. Furthermore, the assumptions of normality of

the error distribution, linearity between the predictor variables and the dependent variable, homoscedasticity, and absence of multicollinearity between predictor variables were checked. Additionally, the representativeness of the sample for the population, the sample size, and the independency of the errors were checked to ensure a reliable analysis of the data. All assumptions were met. Multi-group confirmatory factor analysis using SEM was performed to evaluate the adequacy of the hypothesized factor structure. The dependent variable was emotional eating and the independent variable was social anxiety, split into the three constructs. Two models were proposed: one for normative adolescents and one for academically gifted adolescents. By performing this type of analysis, the possible relationships between the three subtypes of social anxiety and emotional eating in adolescents could be determined, and specifically, if and how this relationship differs for academically gifted adolescents.

Results

Table 1 shows the correlations, means, standard deviations, and internal consistency measures for the used questionnaires.

The proposed model is shown in Figure 1. The items from the questionnaires form the four constructs: FNE, SAD-general, SAD-new, and emotional eating.

A satisfactory model fit is obtained if the root mean square error of approximation (RMSEA) is below .08, the chi-square to degrees of freedom ratio (CMIN/DF) is below 3 and the comparative fit index (CFI) is close to .95 (Milfont & Fischer, 2010). The results showed a good fit of the proposed model ($\chi^2 = 1034.01$, $df = 474$; CFI = .905, CMIN/ $df = 2.18$; RMSEA = .053). Seven error residuals were correlated in the model; however, these correlations are within the same factor.

Table 1. Descriptive statistics for the research measures.

	M	SD	Correlation			
			1	2	3	4
Emotional Eating	1.66	.75	1	.29**	.15**	.19**
Fear of Negative Evaluation by Peers	2.32	.89		1	.53**	.57**
Social Avoidance and Distress for General Situations with Peers	2.01	.80			1	.68**
Social Avoidance and Distress for New Situations or Unfamiliar Peers	2.39	.83				1

* $p < .05$. ** $p < .01$

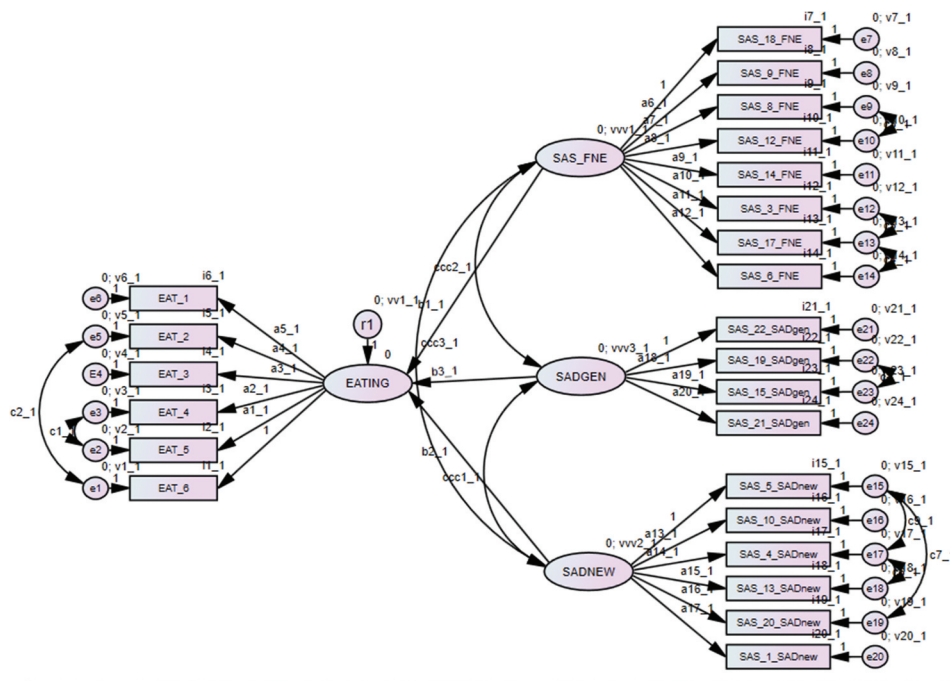


Figure 1. The proposed model for the multi-group confirmatory factor analysis.

These error correlations were utilized to achieve model fit. This covariation can be due to two main factors: 1) common data collection methods (individual self-reporting) or 2) a theoretical overlap in terms of content contained and captured through the operationalization of these variables. Thus, the error terms most likely reflected common variance between the components, which has been found to be acceptable in general practice (Cole, Ciesla, & Steiger, 2007).

Invariance tests

To evaluate whether the proposed model's structure was invariant for both subgroups, measurement invariance was studied by assessing configural, metric, and scalar invariance (Milfont & Fischer, 2010). In configural invariance tests, only the unconstrained model was evaluated. To analyze metric invariance, parameters were constrained to check equality of invariance between groups. To analyze scalar invariance, intercepts and factor loadings were being constrained between groups. Generally, if CFI changes less than .01, the most restrictive model can be accepted (Milfont & Fischer, 2010). Table 2 shows the results of the

Table 2. Test of measurement invariance with academically gifted and normative adolescents as subgroups.

	χ^2	df	CFI	Δ CFI	CMIN/df	RMSEA
Configural invariance	1034.01	474	.910		2.18	0.05
Metric invariance	1055.03	494	.905	< .01	2.14	0.05
Scalar invariance	1120.27	518	.901	< .01	2.16	0.05

measurement invariance tests. These results demonstrate invariance of the proposed model for both groups.

In Table 3 the Critical Ratio (CR) is displayed. This value is often treated as a Z-score, assuming that the sample size consists of at least one hundred participants. The CR is a coefficient divided by the standard error (Schmid, 2015).

Table 3. Regression weights for differential relationships.

	Estimate	SE	CR	p
FNE to EATING				
Academically Gifted	.076	.15	.513	.608
Normative	.255	.07	3.55	< .001
SADGEN to EATING				
Academically Gifted	-.183	.23	-.81	.417
Normative	-.167	.14	-1.22	.222
SADNEW to EATING				
Academically Gifted	.293	.36	.81	.417
Normative	.277	.20	1.38	.169

FNE; fear of negative evaluation, SADGEN; distress for general situations, SADNEW; Distress in New Situations.

Mean differences in social anxiety

In order to test for mean differences between normative academically gifted students, the mean scores for gifted students were constrained in SEM to zero and for normative students, these parameters were allowed to freely estimate. This allows significance testing within the SEM software. Tests revealed significantly higher levels for normative students for the concepts SAD-new ($CR = 1.97, p = .048$) and SAD-general ($CR = 2.75, p = .006$). For FNE, no significant results were revealed ($CR = .639, p = .523$).

Differential relationships between emotional eating and social anxiety

Fear of negative evaluation

Table 3 shows the regression weights for the social anxiety subscale Fear of Negative Evaluation by Peers to Emotional Eating. For normative adolescents, the regression weight was significant ($CR = 3.55, p < .001$). This indicates that there is a positive relationship between Fear of Negative Evaluation by Peers and Emotional Eating. For academically gifted adolescents, the regression weight was non-significant ($CR = .513, p = .608$).

Social avoidance and distress for general situations with peers

Table 3 shows the regression weights for the social anxiety subscale Social Avoidance and Distress for General Situations with Peers. The regression weights were nonsignificant for both normative adolescents ($CR = -1.22, p = .222$) and academically gifted adolescents ($CR = -.81, p = .417$).

Social avoidance and distress for new situations or unfamiliar peers

Table 3 shows the regression weights for the social anxiety subscale Social Avoidance and Distress for New Situations or Unfamiliar Peers. The regression weights were nonsignificant for both normative adolescents ($CR = -1.22, p = .222$) and academically gifted adolescents ($CR = .81, p = .417$).

Mean differences in emotional eating

In order to test for mean differences between normative academically gifted students, the mean

scores for gifted students were constrained in SEM to zero and for normative students, these parameters were allowed to freely estimate. This allows significance testing within the SEM software. Tests revealed significantly lower levels for gifted students for Emotional Eating ($CR = -3.53, p = .048$).

Discussion

The purpose of the current research was to examine potential differences in the level of social anxiety as well as, the relationship between social anxiety and emotional eating, and to examine whether this relationship differs between academically gifted adolescents and normative adolescents. In order to evaluate these research questions, the data were analyzed using structural equation modeling. To this end, the proposed model's structure was tested for configural, metric and scalar invariance across the two groups. Since invariance was achieved, this research has established, in this sample, that all four constructs exist in both populations and that these constructs are similar for academically gifted adolescents as well as, normative adolescents.

Mean differences in social anxiety

Tests revealed that normative adolescents reported higher levels of anxiety (avoidance and distress) for new or unfamiliar situations (SAD-new) as well as, general situations (SAD-general). These findings are in line with harmony theory and reflect similar findings that Godor and Szymanski (2017) report wherein academically gifted students either reported the same levels or statistically higher levels for the social construct sense of belonging and similar or statistically lower levels for sense of loneliness. For fear of negative evaluation (FNE), there were no significant differences between the groups. This indicates that academically gifted students did not differ from normative students in terms of anxiety for being socially evaluated.

Differential relationships for social anxiety and emotional eating in normative adolescents

The current research showed that only the relationship between the social anxiety component fear of

negative evaluation and emotional eating was significant for normative adolescents. Previous studies have demonstrated the positive relationship between emotional eating and social anxiety in adults (Fitzsimmons & Bardone-Cone, 2011; Ostrovsky et al., 2013). Specifically for pre-adolescent children, Czaja et al. (2009) found a positive relationship between overeating and general anxiety. However, previous research has reported that only fear of negative evaluation was significantly related to distorted eating patterns in first-year university females (Gilbert & Meyer, 2005; Vander Wal et al., 2008; Wonderlich-Tierney & Vander Wal, 2010). Therefore, the expectation was that there would be a positive relationship between social anxiety and emotional eating in adolescents and, specifically, that this relationship would be through the subcomponent of social anxiety fear of negative evaluation. The results for normative adolescents support this hypothesis. This confirmation indicates that the relationship between fear of negative evaluation by one's social environment is stronger for these students and may play an important role for self-development during adolescence.

In the current research, no significant relationships were found between emotional eating and the remaining two components, social anxiety and distress for new or unfamiliar situations and social anxiety for general situations. The results of Gilbert and Meyer (2005), Vander Wal et al. (2008), and Wonderlich-Tierney and Vander Wal (2010), along with the results of the current research indicate that the somatic and affective aspects of social anxiety might not be related to the use of emotion-focused coping mechanisms. Adolescents might be able to cope adequately with somatic and affective symptoms of social anxiety and the cognitive aspect of social anxiety might weigh more heavily as cognitive control functions in the brain are not yet fully developed in adolescence (Blakemore & Choudhury, 2006).

Differential relationships for social anxiety and emotional eating in academically gifted adolescents

In the current research no significant relationships were found between the three components of social anxiety and emotional eating as an emotion-

focused coping strategy for academically gifted adolescents. Previous research has shown that academically gifted children use more effective problem-focused approaches in coping mechanisms in comparison to their normative peers (Coleman, 1992; Preuss & Dubow, 2004). Their normative peers generally used distancing and externalization strategies instead of the preferred problem-focused coping strategy of gifted adolescents which is based upon action-oriented solutions. The lack of a significant relationship for FNE in academically gifted as opposed to significant relationships for normative adolescents might be explained by different coping mechanisms employed for social anxiety. Moreover, the construct FNE did not significantly differ between these two groups ($p = .523$). Thus potentially supporting a differential employment of coping strategies between these two groups of adolescents.

Because of their enhanced cognitive capabilities (Baker, 1995; Warne, 2015), academically gifted adolescents may be better able to reduce their stress by putting their own thoughts into perspective than their normative peers. Zysberg and Rubanov (2010) report a similar finding demonstrating higher emotional intelligence was negatively correlated with the tendency for emotional eating. However, the underlying relationships might be more complex. For example, Parker et al. (2008) found that emotional intelligence was a moderate to strong predictor of addictive behaviors in adolescents. As addictive behaviors could be seen as an emotion-focused coping mechanism, one could conclude that higher emotional intelligence does not automatically lead to less emotion-focused coping.

These differential employment of coping strategies could also be attributed to IQ. Chandola et al. (2006) reported a negative relationship between IQ and BMI over one's lifetime. It appears that IQ, and more generally educational attainment as a potential proxy, acts as a protective factor for later in life weight gain since lower IQ scores were correlated with obesity and weight gain in adulthood. Noteworthy in this study is that IQ was measured at age 11 and similar to the current population. It could be hypothesized that the lack of relationship between FNE and emotional eating in academically gifted adolescents (current study) might be one of the elements of this protective

factor that Chandola, et al. reports for high IQ children.

In conclusion, the current research provides a better understanding of the relationship between social anxiety and emotional eating in normative and academically gifted adolescents. Therefore, it may be beneficial for clinicians, teachers and caregivers to consider adolescents' fears around negative evaluation when designing programs to address the adolescents' weight, as this fear could cause or contribute to the adolescents' weight gain and maintenance. Another suggestion for professionals would be to focus more on the fear of negative evaluation as a possible trigger for emotional eating in treatment centers for adolescents who suffer from social anxiety and demonstrate emotional eating problems. Professionals should consider that academically gifted adolescents might endorse different ways of coping.

Limitations and future research

A number of limitations should be pointed out. The generalizability of the findings is limited by the fact that all participants were high school students from one town in The Netherlands. Additionally, the self-report questionnaires used to measure feelings of social anxiety and emotional eating behavior are limited as no corroborating evidence was gathered from parent or teacher questionnaires, or by conducting clinical interviews. Moreover, BMI was not measured and no IQ tests were used to determine academic giftedness directly. Academically gifted adolescents were selected based on their score on their Dutch national exam scores and not a formal IQ test. Future studies could use explicit IQ tests to ensure adequate separation of intelligence level groups. A factor further limiting generalizability is that only students who attended average or high educational levels were included.

Future research projects would benefit from the exploration and addition of coping mechanisms to such studies. This could allow researchers to investigate the potential mediational effects of coping strategies between anxiety and emotional eating. As discussed above, the differential coping strategies employed between gifted and normative could play a role in the link between anxiety and emotional eating in terms of how these strategies differ

the effectivity of the employed strategies as well as, potential links to BMI, self-image, suicidal ideation and general wellbeing.

Disclosure statement

No potential conflict of interest was reported by the authors.

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