Revisiting alexithymia as an important construct in the treatment of anorexia nervosa: A
proposal for future research

Vinushini Arunagiri, M.A.¹, & Erin E. Reilly, Ph.D.¹

¹Hofstra University, Department of Psychology

*The current manuscript was accepted for publication in Eating Disorders: The Journal of Treatment and Prevention.

Correspondence concerning this article should be addressed to: Erin E. Reilly, Ph.D., 210 Hauser
Hall, Hofstra University, Hempstead, NY 11549; erin.e.reilly@hofstra.edu

Abstract

Consistent research supports altered emotional processing in adult patients with anorexia nervosa (AN), including elevations in alexithymia, or deficits in identifying and describing emotions and other internal experiences. Despite increasing interest in emotion-focused therapies for AN, alexithymia is often not directly addressed within many existing treatments, and little empirical work has moved beyond descriptive, cross-sectional research. In this paper, we propose that refining the field's understanding of alexithymia may provide insights into poor outcomes in existing psychological treatments for AN. First, we provide an brief overview of existing work exploring alexithymia in AN, and then describe several next steps in treatment-relevant research, including differentiating alexithymia from related constructs, considering neurobiological correlates of alexithymia, testing the link between alexithymia and outcome across treatment modalities, and piloting adjunctive treatment techniques focused on emotional identification and description. Altogether, exploring adjunctive treatment approaches targeting alexithymia may offer one promising possibility for improving long-term outcomes.

Keywords: anorexia nervosa; alexithymia; emotion identification; treatment outcomes

Revisiting alexithymia as an important construct in the treatment of anorexia nervosa: A proposal for future research

There have been significant efforts to develop innovative treatments targeting cognitive and behavioral symptoms for adults with anorexia nervosa (AN) (Watson & Bulik, 2013). However, existing data suggests that specialized treatments for weight gain do not offer any significant advantage over control or placebo treatments long-term, and there are no short- or long-term differences between active and placebo treatments for targeting cognitive symptoms (Murray et al., 2019; Watson & Bulik, 2013). Therefore, it is critical to identify novel treatments for AN or methods to improve the effectiveness of existing interventions.

In the current manuscript, we propose that renewed empirical consideration of the role of alexithymia— defined as difficulties with experiencing, identifying, describing, and verbalizing emotional states (Hendryx et al., 1991)— in treatment may yield fruitful insights for improving outcomes. Despite consensus that alexithymia is commonly present in AN (for reviews, see Nowakowski et al., 2013; Westwood et al., 2017), there has been little empirical work beyond description of self-report scales, which presents a barrier for the field’s ability to effectively conceptualize how this factor may play a role in symptoms and can be targeted in treatment. Further, over the past several years, several research groups have published preliminary data focusing on treatment approaches for AN focused on emotional under-expression or difficulties identifying and describing emotions (e.g., Schmidt et al., 2018; Tchanturia et al., 2015). However, while these efforts have yielded promising initial results in non-randomized, small-scale designs, the majority of existing widely-used treatments do not include explicit focus on emotion identification, despite theoretical reason to believe that this construct could interfere with completion of treatment tasks.

To highlight the need for future research on alexithymia and its role in treatment, we first provide a brief overview of existing descriptive and treatment-focused research on alexithymia in AN (for comprehensive reviews, see Nowakowski et al., 2013; Westwood et al., 2017). Then, we will turn to our main focus: outlining a number of important areas for future research in the treatment domain. Notably, while alexithymia is elevated across ED diagnoses, we will focus our discussion on the ways in which this construct is understood and may relate to outcomes in adult AN, given existing data suggesting particularly difficulties with emotion identification and poorer outcomes in this group. However, it is likely that many of the discussed topics and directions for future research may hold relevance across different diagnostic categories and age groups. Altogether, our goal is not to provide a comprehensive review of existing research in alexithymia, but to highlight the need to consider this construct more comprehensively as it relates to treatment and to propose next steps in research in this area.

Alexithymia and AN: Existing Evidence

As noted previously, alexithymia refers to challenges with identifying and describing emotional states, as well as a decreased tendency to think about one's internal experience (Hendryx et al., 1991). Alexithymia can be conceptualized as a deficit in the cognitive-experiential components of the emotion system, such as subjective awareness and the verbal reporting of feelings (Eizaguirre et al., 2004). Generally, data in non-clinical samples suggests that alexithymia demonstrates relative stability over time (e.g., Tolmunen et al., 2011). However, data also supports malleability (i.e., lack of "absolute stability") in alexithymia, and particularly in clinical populations over the course of treatment, suggesting that it can be targeted effectively in psychological interventions (e.g., de Haan et al., 2012; Rufer et al., 2004).

Over the past decade, alexithymia been proposed as a prominent clinical feature of EDs and is often included within larger socioaffective theories of AN (Fizaguirre et al., 2004; Brewer, Cook, Cardi, Treasure, & Bird, 2015; Treasure & Schmidt, 2013). Within these models, symptoms of AN, such as starvation, are thought to be attempts to regulate distressed and undifferentiated emotional states (Eizaguirre et al., 2004; Treasure & Schmidt, 2013). Regarding existing data in this domain, recent systematic reviews and meta-analyses suggest large mean differences in self-reported alexithymia between individuals with AN and healthy controls, with the most consistent findings for the Difficulties Identifying Feelings and Difficulties Describing Feelings subscales of the Toronto Alexithymia Scale (Nowakowski et al., 2013; Westwood et al., 2017). Studies reporting “clinical cutoff” scores for the TAS generally suggest that over 50% of individuals in clinical samples endorse significant alexithymia (Nowakowski et al., 2013). Further, related research has indicated impairments on other facets of emotion processing and regulation that relate to alexithymia, including reduced facial expressiveness (Bora & Kose, 2016; Brockmeyer, Pellegrino, Münch, Herzog, Dziobek, & Friederich, 2016), facial emotion expressivity, emotion recognition, and self-report measurements of non-acceptance of emotions (Davies, Swan, Schmidt, & Tchanturia, 2012; Harrison, Sullivan, Tchanturia, & Treasure, 2010; Krug et al., 2008). Altogether, existing data suggests that mean levels of alexithymia are elevated in AN compared to controls, but this data remains primarily descriptive in nature and cross-sectional (Nowakowski et al., 2013; Westwood et al., 2017).

Based on these studies and the clinical relevance of alexithymia in AN, several research groups have developed treatments with a focus on emotional identification and experiencing, such as the MANTRA (Maudsley Model of Anorexia Nervosa Treatment in Adults) intervention, which was created for adult patients with AN based on a cognitive-interpersonal therapy model

(Schmidt et al., 2018). MANTRA includes modules on difficulties in managing, showing and “being with” emotions in the context of relationships in addition to other cognitive and social targets (Schmidt et al., 2017). Initial studies testing MANTRA have found a significant improvement in BMI, ED symptomology and affective symptoms and psychosocial impairment associated with the intervention, although a recent trial suggested that there were no significant differences in symptoms between MANTRA and the comparison treatment, Specialist Supportive Clinical Management (Schmidt, 2015). Another treatment that was developed to target emotional processing in AN is the Cognitive Remediation and Emotion Skills Training (CREST) protocol (Tchanturia et al., 2015). CREST sessions include a focus on the development of emotion recognition skills and the management and expression of emotion, in addition to targeting other cognitive features of AN. Pilot results from the intervention suggested decreases in TAS scores and social anhedonia that were small in magnitude (Tchanturia et al., 2015). In sum, there have been several recent attempts to develop psychological interventions for AN with an explicit focus on emotion identification, management, and expression (for review, see Sala et al., 2017). However, rigorous longitudinal data supporting these treatments remains limited, and widely-used interventions for AN (e.g., Cognitive Behavioral Therapy, Enhanced) do not include an explicit focus on emotion psychoeducation, identification, or description.

Future Directions for Research on Alexithymia

While consistent research suggests that alexithymia is a commonly-observed clinical feature in AN samples and initial results from emotion-focused AN treatments are promising, there are a number of questions regarding this construct that remain unanswered. Below, we outline directions for future research exploring alexithymia as a treatment-interfering process in AN.

149 **Differentiating Related Constructs**

150 We propose that a prerequisite of considering the role of alexithymia treatment of AN is
151 to clarify several existing questions regarding the construct itself, all of which will have bearing
152 for how it is targeted in treatment. First, future research must explore whether the difficulties
153 evaluating and labeling emotional experiences in AN are uniquely related to trait-level
154 alexithymia, or whether these challenges are better accounted for by long-standing emotional
155 suppression and/or experiential avoidance. Some research has suggested that alexithymia in AN
156 samples is related to an intense fear of feeling overwhelmed (Fox & Power, 2009). Specifically,
157 it may be the case that individuals' difficulties identifying their emotional experience are
158 secondary to engagement in experiential avoidance, rather than a challenge in identifying and
159 discerning emotions per se. While it may be challenging to disentangle these possibilities
160 methodologically, given data suggesting that individuals that have greater baseline alexithymia
161 are more prone to engage in suppression as an emotion regulation strategy (Swart, Kortekaas, &
162 Aleman, 2009), better distinguishing between sources of difficulty experiencing emotions could
163 have distinct treatment implications. For instance, targeting alexithymia secondary to long-
164 standing experiential avoidance would focus more explicitly on fostering willingness to
165 experience and sit with aversive emotional states, whereas targeting trait-level alexithymia may
166 focus heavily on upregulation of emotional states and practice differentiating between different
167 emotional experiences.

168 In addition to emotion suppression, it will also be important to differentiate between self-
169 reported alexithymia and interoceptive awareness, which refers to an individual's perception of
170 their internal body states. Notably, interoceptive awareness and alexithymia are overlapping, yet
171 distinct, processes, as it is likely that an individual's awareness of internal body states may affect

their ability to identify emotional states (Brewer et al., 2016). Limited work has explored overlap between interoception and alexithymia, with some initial work demonstrating strong correlations between the two across non-clinical, other clinical samples, and AN (e.g., Herbert et al., 2011; Mul et al., 2018; Pollatos et al., 2008); however, further clarifying the relation between these constructs may hold relevance for appropriate selection of interventions—such as choosing an intervention focused on interoceptive exposure for those who demonstrate difficulties identifying homeostatic states versus an intervention focused on increasing emotion vocabulary for those with challenges describing their emotions.

Finally, it will also be important to clarify the distinction between depressive symptoms and alexithymia, as past work has indicated mixed findings regarding whether individuals with AN demonstrate alexithymia after accounting for depression. Some studies found significantly higher scores of alexithymia in AN after controlling for depression levels (Bourke, Taylor, Parker & Bagby, 1992; Sexton, Sunday, Hurt & Halmi, 1998). Alternatively, Rozenstein and colleagues (2011) found that depression explained group differences in the TAS-20 total score for patients with AN-R but not for patients with AN B/P, while Bydlowski and colleagues (2005) and Gilboa-Schechtman and colleagues (2006) failed to find any difference between the groups. Future research must consistently assess and statistically control for depressive symptoms to ensure that alexithymia represents a distinct clinical feature that warrants specialized clinical attention.

Influence of Underweight Status

Another important direction concerns state-based influences on individuals' ability to identify and describe their emotions. It remains unclear whether the alexithymia commonly observed in AN is universally trait-based in nature or is better accounted for by state-based

malnutrition, as limited work has shown significant decreases in alexithymia following weight restoration but suggest continued elevations compares to healthy controls (e.g., Beadle et al., 2013; Tchanturia et al., 2012). Therefore, future work testing associations between alexithymia and treatment response must measure and account for the influence of nutritional status, as it may be the case that alexithymia-specific treatment techniques are best placed following weight restoration.

Neurobiological Research on Alexithymia

In a related manner, we propose that research on emotion identification in EDs and AN should also consider use of biological measurements. Better characterizing biological correlates of alexithymia could provide a deeper understanding of how this ability develops but may also open avenues for adjunctive biological treatments (e.g., psychopharmacological approaches; real-time fMRI; brain stimulation).

Outside of EDs, researchers have begun to explore neural and psychophysiological correlates of alexithymia across different populations. A recent review of existing neuroimaging work in this domain highlights links between alexithymia and abnormal functional activity in brain regions involved in affective and somatic processing, including the amygdala, insula, and cingulate cortex (Moriguchi & Komaki, 2013). More specifically, consistent research supports an association between alexithymia and *decreased* neural response in affective regions of the brain to emotional stimuli and prompts to engage in mental imagery; on the other hand, results also suggest that individuals with alexithymia demonstrate *increased* neural responsivity to physical or somatic stimuli (Moriguchi & Komaki, 2013). Outside of neuroimaging research, some work in community samples and other clinical populations (e.g., ASD) using psychophysiological measurements suggests that alexithymia may be related both to abnormal autonomic responses to

emotional cues (e.g., decreased reactivity to emotional cues) and lack of concordance between self-report and psychophysiological measurements (e.g., Gaigg et al., 2018; Peasley-Miklus et al., 2016).

Altogether, research implicates abnormal neural and psychophysiological responses to both physical and affective stimuli in individuals with alexithymia. To date, only one study has demonstrated a link between abnormal neural responses to physical stimuli and self-reported alexithymia in an AN sample, such that women recovered from AN who reported greater alexithymia demonstrated abnormal insula responses to a pain probe (Strigo et al., 2013). These findings are consistent with other neuroimaging work in alexithymia more broadly (Moriguchi & Komaki, 2013), and support that further investigation of neural and psychophysiological correlates of alexithymia in AN may be important.

Functional Links Between Alexithymia and AN Symptoms

To date, there is limited research directly testing hypotheses regarding how alexithymia may promote or maintain engagement in symptoms. Several theoretical frameworks propose that broad socioaffective deficits in AN, including alexithymia, promote negative social experiences, which in turn result in elevations in social isolation/avoidance, negative affect, and subsequent dietary restriction (Courty et al., 2015; Treasure & Schmidt 2013). Additionally, it is also possible that weight loss may exacerbate difficulties with alexithymia (e.g., Beadle et al., 2013), perpetuating the cycle. Finally, drawing from existing work in interoceptive deficits in AN (Jenkinson et al., 2018), it could be the case the difficulties with correctly identifying internal states results in misperception of both emotional and homeostatic physiological signals, resulting in lack of trust in body signals (Brown et al., 2017), negative affect, and inability to effectively respond to hunger, satiety, and emotional cues.

Associations between Alexithymia and Treatment Outcome

In addition to interfering with treatment progress through perpetuating engagement in symptoms, elevations in alexithymia may interfere with therapeutic progress on a process level. Specifically, elevations in alexithymia could interfere with the success of evidence-based treatments that emphasize or require emotional experiencing, tracking, or regulation. For example, patients with alexithymia tend to use vocabulary that is of limited complexity and are more concrete in their thinking, making it difficult for them to understand metaphors and mental imagery that are typically used in psychotherapy (Kreitler, 2002). Further, these patients tend to have lower recall for emotional material, which can impede on implementing effective therapeutic strategies that require a patient to provide examples of emotional experiences and dysregulation (e.g., Luminet, Vermeulen, Demaret, Taylor, & Bagby, 2006).

While no work to date has specifically explored the direct effect of alexithymia on effective completion of therapy tasks, some research in eating disorders have found links between alexithymia and worse outcome at discharge. Specifically, two studies have indicated found that elevations in alexithymia at intake to treatment predict worse outcome, operationalized as greater self-reported eating disorder symptoms at discharge from treatment (Vrieze, 2018) and greater likelihood of having a clinical or sub-clinical eating disorder at 3-year follow-up (Speranza et al., 2007). Of note, these studies included mixed diagnostic samples, but were predominantly comprised of individuals with AN. Altogether, initial data are consistent with the assertion that elevated alexithymia may interfere with treatment response, but more research is critical to specifically test the assertion that greater difficulties identifying and describing emotions may interfere with the successful completion of therapy tasks.

To our knowledge, alexithymia has only been explored as an outcome measurement for interventions that specifically target emotional identification in AN (Money et al., 2011; Tchanturia, Doris, Mountford & Fleming, 2015). These studies found that qualitatively, patients responded positively to the emotion skills training and that TAS scores significantly decreased (with a small effect size; Tchanturia et al., 2015). Given limited exploration of alexithymia as a predictor of outcome, future research must explore links between alexithymia and outcome in existing treatments. This work is required to directly test the possibility that issues with alexithymia may interfere with treatments that do not include an explicit focus on emotion identification. In theory, alexithymia could be more or less central to treatment success, depending on the extent to which the client is required to track and alter emotional experiences; therefore, it is possible that higher alexithymia may be differentially related to symptom change across treatments.

Supplemental Emotion Work in Enhancing Outcomes.

Research in other psychiatric disorders, including depression, anxiety, and substance use, suggests that traditional CBT-based treatments may improve alexithymia, particularly when the therapy explicitly targets this skill (for review see Cameron et al., 2013). The magnitude of changes across studies are consistent with conceptualizations of alexithymia as malleable but possessing relative stability, and data also tentatively suggest that the structure of CBT-based techniques may be particularly suited to improving alexithymia, although the reasons why this effect exists remain unclear (Cameron et al., 2013). Importantly, despite the fact that prominent theories of AN consistently implicate alterations in emotional processing in symptom etiology and maintenance (e.g., Haynos & Fruzzetti, 2011), many traditional treatments do not explicitly include basic emotion-related psychoeducation and focus on altering emotional experiences, and

thus may be challenging for those individuals who struggle with alexithymia. Specifically, we hold that if not addressed explicitly through psychoeducation and targeted skills training, significant difficulties identifying and engaging with emotional experiences could interfere with effective completion of therapy tasks.

If work exploring links between emotion identification and outcome indicates that baseline alexithymia predicts a patient's success in treatment, future work should explore whether augmenting existing treatments to include an explicit focus on alexithymia improves outcomes, as work in other disorders (e.g., Cameron et al., 2013) and initial work in AN both suggest that alexithymia may be modifiable (e.g., Money et al., 2011). One recent study conducted in a mixed diagnostic sample of EDs found that an emotion psychoeducation program did not have a significant influence on treatment outcomes, measured self-reported eating disorder symptoms (Storch, Keller, Weber, Spindler, & Milos, 2011); however, this study was limited by a small sample size ($n = 8$ in active treatment group). While there are many options for how alexithymia may be targeted in treatment, we propose that treatments include psychoeducation on different emotional states, repeated practice eliciting and describing emotional states, and if applicable, exposure exercises focused on building tolerance of and non-judgmental awareness of strong emotion states. Further, in treatments that already target emotional processes but may focus predominantly on other facets of emotional regulation (e.g., building skills for rash responses to negative emotion in DBT), it may be necessary to increase the focus or time spent on foundational emotion identification skills.

Conclusions

Despite wide recognition that many individuals with AN struggle to identify and describe their emotional experiences, few existing treatments include psychoeducation and skills focused

on improving alexithymia. We propose that treatments for AN presuppose an existing ability to identify, track, and describe emotional and internal states, and therefore, those who struggle with this ability may experience worse outcomes. Future research must test this possibility directly, clarify overlap and distinctions between alexithymia and related constructs (e.g., interoceptive awareness), and explore the additive benefit of adding training in emotional identification skills training to psychological treatments for AN.

References

- Beadle, J. N., Paradiso, S., Salerno, A., & McCormick, L. M. (2013). Alexithymia, emotional empathy, and self-regulation in anorexia nervosa. *Annals of Clinical Psychiatry*, 25, 107-120.
- Bora, E., & Köse, S. (2016). Meta-analysis of theory of mind in anorexia nervosa and bulimia nervosa: A specific impairment of cognitive perspective taking in anorexia nervosa?. *International Journal of Eating Disorders*, 49, 739-740. doi:10.1002/eat.22572
- Brewer, R., Cook, R., Cardi, V., Treasure, J., & Bird, G. (2015). Emotion recognition deficits in eating disorders are explained by co-occurring alexithymia. *Royal Society Open Science*, 2, 140382. doi:10.1098/rsos.140382
- Brewer, R., Cook, R., & Bird, G. (2016). Alexithymia: a general deficit of interoception. *Royal Society Open Science*, 3, 150664. doi:10.1098/rsos.150664
- Brockmeyer, T., Pellegrino, J., Münch, H., Herzog, W., Dziobek, I., & Friederich, H. C. (2016). Social cognition in anorexia nervosa: specific difficulties in decoding emotional but not nonemotional mental states. *International Journal of Eating Disorders*, 49, 883-890. doi:10.1002/eat.22574
- Brown, T. A., Berner, L. A., Jones, M. D., Reilly, E. E., Cusack, A., Anderson, L. K., ... & Wierenga, C. E. (2017). Psychometric evaluation and norms for the Multidimensional Assessment of Interoceptive Awareness (MAIA) in a clinical eating disorders sample. *European Eating Disorders Review*, 25, 411-416. doi:10.1002/erv.2532
- Cameron, K., Ogrodniczuk, J., & Hadjipavlou, G. (2013). Changes in alexithymia following psychological intervention: a review. *Harvard Review of Psychiatry*, 22, 162-178. doi:10.1097/HRP.0000000000000036

- 341 Davies, H., Swan, N., Schmidt, U., & Tchanturia, K. (2012). An experimental investigation of
342 verbal expression of emotion in anorexia and bulimia nervosa. *European Eating*
343 *Disorders Review*, 20, 476-483. doi:10.1002/erv.1157
- 344 de Haan, H., Joosten, E., Wijdeveld, T., Boswinkel, P., van der Palen, J., & De Jong, C. (2012).
345 Alexithymia is not a stable personality trait in patients with substance use
346 disorders. *Psychiatry Research*, 198, 123-129. doi:10.1016/j.psychres.2011.09.027
- 347 Eizaguirre, A. E., de Cabezón, A. O. S., de Alda, I. O., Olariaga, L. J., & Juaniz, M. (2004).
348 Alexithymia and its relationships with anxiety and depression in eating disorders.
349 *Personality and Individual Differences*, 36, 321-331.
350 doi:10.1016/S0191-8869(03)00099-0
- 351 Fox, J. R., & Power, M. J. (2009). Eating disorders and multi-level models of emotion: An
352 integrated model. *Clinical Psychology & Psychotherapy: An International Journal of*
353 *Theory & Practice*, 16, 240-267. doi:10.1002/cpp.626
- 354 Gaigg, S. B., Cornell, A. S., & Bird, G. (2018). The psychophysiological mechanisms of
355 alexithymia in autism spectrum disorder. *Autism*, 22, 227-231.
356 doi: 10.1177/1362361316667062
- 357 Harrison, A., Sullivan, S., Tchanturia, K., & Treasure, J. (2010). Emotional functioning in eating
358 disorders: attentional bias, emotion recognition and emotion regulation. *Psychological*
359 *Medicine*, 40, 1887-1897. doi:10.1017/S0033291710000036
- 360 Haynos, A. F., & Fruzzetti, A. E. (2011). Anorexia nervosa as a disorder of emotion
361 dysregulation: Evidence and treatment implications. *Clinical Psychology: Science and*
362 *Practice*, 18, 183-202. doi:10.1111/j.1468-2850.2011.01250.x

- 363 Hendryx, M. S., Haviland, M. G., & Shaw, D. G. (1991). Dimensions of alexithymia and their
364 relationships to anxiety and depression. *Journal of Personality Assessment*, 56, 227-237.
365 doi:10.1207/s15327752jpa5602_4
- 366 Herbert, B. M., Herbert, C., & Pollatos, O. (2011). On the relationship between interoceptive
367 awareness and alexithymia: is interoceptive awareness related to emotional
368 awareness?. *Journal of Personality*, 79, 1149-1175.
369 doi:10.1111/j.1467-6494.2011.00717.x
- 370 Jenkinson, P. M., Taylor, L., & Laws, K. R. (2018). Self-reported interoceptive deficits in eating
371 disorders: A meta-analysis of studies using the eating disorder inventory. *Journal of*
372 *Psychosomatic Research*, 110, 38-45. doi:10.1016/j.jpsychores.2018.04.005
- 373 Kreitler, S. (2002). The psychosemantic approach to alexithymia. *Personality and Individual*
374 *Differences*, 33, 393-407. doi:10.1016/S0191-8869(01)00163-5
- 375 Krug, I., Bulik, C. M., Vall-Llovera, O. N., Granero, R., Agüera, Z., Villarejo, C., ... &
376 Fernández-Aranda, F. (2008). Anger expression in eating disorders: clinical,
377 psychopathological and personality correlates. *Psychiatry Research*, 161, 195-205.
378 doi:10.1016/j.psychres.2007.10.003
- 379 Luminet, O., Vermeulen, N., Demaret, C., Taylor, G. J., & Bagby, R. M. (2006). Alexithymia
380 and levels of processing: Evidence for an overall deficit in remembering emotion words.
381 *Journal of Research in Personality*, 40, 713-733. doi:10.1016/j.jrp.2005.09.001
- 382 Money, C., Davies, H., & Tchanturia, K. (2011). A case study introducing cognitive remediation
383 and emotion skills training for anorexia nervosa inpatient care. *Clinical Case Studies*, 10,
384 110-121. doi:10.1177/1534650110396545

- 385 Moriguchi, Y., & Komaki, G. (2013). Neuroimaging studies of alexithymia: physical, affective,
386 and social perspectives. *BioPsychoSocial Medicine*, 7, 8. doi:10.1186/1751-0759-7-8
- 387 Mul, C. L., Stagg, S. D., Herbelin, B., & Aspell, J. E. (2018). The feeling of me feeling for you:
388 Interoception, alexithymia and empathy in autism. *Journal of Autism and Developmental*
389 *Disorders*, 48, 2953-2967. doi:10.1007/s10803-018-3564-3
- 390 Murray, S. B., Quintana, D. S., Loeb, K. L., Griffiths, S., & Le Grange, D. (2019). Treatment
391 outcomes for anorexia nervosa: a systematic review and meta-analysis of randomized
392 controlled trials. *Psychological Medicine*, 49, 535-544. doi:10.1017/S0033291718002088
- 393 Oldershaw, A., Hambrook, D., Tchanturia, K., Treasure, J., & Schmidt, U. (2010). Emotional
394 theory of mind and emotional awareness in recovered anorexia nervosa
395 patients. *Psychosomatic Medicine*, 72, 73-79. doi:10.1097/PSY.0b013e3181c6c7ca
- 396 Peasley-Miklus, C. E., Panayiotou, G., & Vrana, S. R. (2016). Alexithymia predicts arousal-
397 based processing deficits and discordance between emotion response systems during
398 emotional imagery. *Emotion*, 16, 164-174. doi:10.1037/emo0000086
- 399 Pollatos, O., Kurz, A. L., Albrecht, J., Schreder, T., Kleemann, A. M., Schöpf, V., ... &
400 Schandry, R. (2008). Reduced perception of bodily signals in anorexia nervosa. *Eating*
401 *Behaviors*, 9, 381-388. doi:10.1016/j.eatbeh.2008.02.001
- 402 Rufer, M., Albrecht, R., Zaum, J., Schnyder, U., Mueller-Pfeiffer, C., Hand, I., & Schmidt, O.
403 (2010). Impact of alexithymia on treatment outcome: a naturalistic study of short-term
404 cognitive-behavioral group therapy for panic disorder. *Psychopathology*, 43(3), 170-179.
- 405 Sala, M., Heard, A., & Black, E. A. (2016). Emotion-focused treatments for anorexia nervosa: a
406 systematic review of the literature. *Eating and Weight Disorders-Studies on Anorexia,*
407 *Bulimia and Obesity*, 21, 147-164. doi:10.1007/s40519-016-0257-9

- Schmidt, U., Sharpe, H., Bartholdy, S., Bonin, E. M., Davies, H., Easter, A., ... & Knightsmith, P. (2017). A randomised controlled multicentre trial comparing the Maudsley Model of Anorexia Nervosa Treatment for Adults with specialist supportive clinical management in outpatients with broad anorexia nervosa (work package 2a). In *Treatment of anorexia nervosa: a multimethod investigation translating experimental neuroscience into clinical practice*. NIHR Journals Library.
- Schmidt, U., Startup, H., & Treasure, J. (2018). *A Cognitive-Interpersonal Therapy Workbook for Treating Anorexia Nervosa: The Maudsley Model*. Routledge.
- Speranza, M., Loas, G., Wallier, J., & Corcos, M. (2007). Predictive value of alexithymia in patients with eating disorders: A 3-year prospective study. *Journal of Psychosomatic Research*, 63, 365-371. doi:10.1016/j.jpsychores.2007.03.008
- Storch, M., Keller, F., Weber, J., Spindler, A., & Milos, G. (2011). Psychoeducation in affect regulation for patients with eating disorders: a randomized controlled feasibility study. *American Journal of Psychotherapy*, 65, 81-93. doi:10.1176/appi.psychotherapy.2011.65.1.81
- Swart, M., Kortekaas, R., & Aleman, A. (2009). Dealing with feelings: characterization of trait alexithymia on emotion regulation strategies and cognitive-emotional processing. *PLoS One*, 4, e5751. doi:10.1371/journal.pone.0005751
- Tchanturia, K., Davies, H., Harrison, A., Fox, J. R., Treasure, J., & Schmidt, U. (2012). Altered social hedonic processing in eating disorders. *International Journal of Eating Disorders*, 45, 962-969. doi:10.1002/eat.22032

- 429 Tchanturia, K., Doris, E., Mountford, V., & Fleming, C. (2015). Cognitive Remediation and
430 Emotion Skills Training (CREST) for anorexia nervosa in individual format: self-
431 reported outcomes. *BMC Psychiatry*, 15, 53. doi:10.1186/s12888-015-0434-9
- 432 Tolmunen, T., Heliste, M., Lehto, S. M., Hintikka, J., Honkalampi, K., & Kauhanen, J. (2011).
433 Stability of alexithymia in the general population: an 11-year follow-up. *Comprehensive*
434 *Psychiatry*, 52, 536-541. doi:10.1016/j.comppsy.2010.09.007
- 435 Treasure, J., & Schmidt, U. (2013). The cognitive-interpersonal maintenance model of anorexia
436 nervosa revisited: a summary of the evidence for cognitive, socio-emotional and
437 interpersonal predisposing and perpetuating factors. *Journal of Eating Disorders*, 1, 13.
438 doi:10.1186/2050-2974-1-13
- 439 Vrieze, A. (2018). *Alexithymia as a Predictor of Outcome in Treatment of Eating Disorders*
440 (Doctoral dissertation, Azusa Pacific University).
- 441 Watson, H. J., & Bulik, C. M. (2013). Update on the treatment of anorexia nervosa: review of
442 clinical trials, practice guidelines and emerging interventions. *Psychological*
443 *Medicine*, 43, 2477-2500. doi:10.1017/S0033291712002620
- 444 Westwood, H., Kerr-Gaffney, J., Stahl, D., & Tchanturia, K. (2017). Alexithymia in eating
445 disorders: Systematic review and meta-analyses of studies using the Toronto Alexithymia
446 Scale. *Journal of Psychosomatic Research*, 99, 66-81.
447 doi:10.1016/j.jpsychores.2017.06.007
448