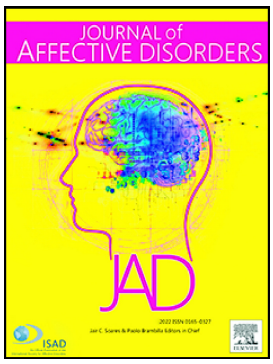

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Alexithymia and Emotion Regulation

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Abstract

Background: Alexithymia is a key transdiagnostic risk factor for emotion-based psychopathologies. Conceptual models specify that this is because alexithymia impairs emotion regulation. However, the extent of these putative emotion regulation impairments remains underexplored. Our aim in this study was to begin to address this gap by examining whether people with high, average, or low levels of alexithymia differ in the types of emotion regulation strategies they typically use. **Method:** General community adults from the United States (*N*=501) completed a battery of alexithymia and emotion regulation measures. Participants were grouped into high, average, and low alexithymia quantiles. **Results:** After controlling for demographics and current levels of distress, the high, average, and low alexithymia groups differed in their use of cognitive and behavioral emotion regulation strategies. Compared to the other groups, the high alexithymia group reported lesser use of generally adaptive regulation strategies (cognitive reappraisal, approaching problems, and seeking social support) and greater use of generally maladaptive regulation strategies (expressive suppression, behavioural withdrawal, ignoring). **Limitations:** Our data were cross-sectional and from self-report questionnaires. Future work in other cultural groups would be beneficial. **Conclusions:** Our results support the view that alexithymia is associated with impaired emotion regulation. In particular, people with high alexithymia seem to exhibit a less adaptive profile of emotion regulation strategies. Direct targeting of these emotion regulation patterns in psychotherapy may therefore be a useful pathway for the treatment of emotional disorder symptoms in people with high alexithymia.

Key Words: Alexithymia; Emotion Regulation; Strategies; Cognitive; Behavioural; Process Model of Emotion Regulation;

Alexithymia is characterized by difficulties identifying feelings (DIF), difficulties describing feelings (DDF), and an externally orientated thinking style (EOT) involving inattention to one's internal emotional states (Preece et al., 2017, 2020a; Sifneos, 1973). This trait was first identified by psychiatrists Sifneos and Nemiah in the 1970s, who observed this pattern of deficits in many of their patients with psychosomatic disorders (Sifneos, 1973). Over five decades later, alexithymia has been consistently associated with a range of psychopathology categories (including mood, anxiety, substance use, eating, and personality disorders; e.g., Taylor et al., 1999), and is widely considered a key transdiagnostic risk factor (Bankier et al., 2001). Much of the theorizing around the transdiagnostic links between alexithymia and psychopathology has centred on the notion that alexithymia is a risk factor because it impairs emotion regulation (e.g., Preece et al., 2017, 2020a; Taylor et al., 1999; Luminet & Zamariola, 2018). However, the precise nature of emotion regulation patterns in alexithymia remains underexplored empirically. Our aim in this study was to begin to address this gap by examining whether people with high, average, or low levels of alexithymia differ systematically in the types of emotion regulation strategies they typically select or use.

Theoretical Framework and Existing Literature

The *attention-appraisal model of alexithymia* (Preece et al., 2017, 2020a) maps alexithymia to the *process model of emotion regulation* (Gross, 1998, 2015). We believe this integration provides a useful framework for thinking about the ways in which alexithymia might impact emotion regulation, and for providing testable predictions. In short, the process model (and attention-appraisal model) specifies that emotions are generated and regulated through four-stage sequences (*situation-attention-appraisal-response*) by which people evaluate features of the world in terms of what they mean for their goals (see Gross, 2015).

Emotions arise when a situation is attended to and has particular meaning in light of currently-active goals. Emotions are regulated when an emotion becomes the target of evaluation such that; one focuses attention on their emotion, appraises their emotion in terms of what it is and what it means for their goals, and decides based on their appraisal to try to up- or down-regulate that emotion using one or more regulation strategies. In this framework, emotion regulation can be described as a series of four stages (Gross, 2015): *identification*, where one decides whether or not to activate a goal to regulate; *selection*, where one selects which emotion strategies to use; *implementation*, where the selected strategies are implemented; and *monitoring*, where one monitors the effect of the emotion regulation strategies and thus decides whether to continue, stop, or switch strategies. Because people high in alexithymia have difficulty attending to and appraising their emotions, and because such nuanced information about emotions is important for optimally informing subsequent emotion regulation decisions (Gross, 2015; Sheppes et al., 2011), alexithymia might impair performance at all four stages of emotion regulation.[1]

At the *identification* stage, people high in alexithymia should likely be making poorer decisions about whether and how to regulate their emotions. This is important because contexts differ in terms of whether emotion regulation is needed, or whether such regulation should involve the down- or up-regulation of emotion (e.g., Aldao & Tull, 2015). At the *selection* stage, people high in alexithymia should likely be worse at selecting adaptive strategies optimally suited to their needs. This is important because emotion regulation strategies differ in their effectiveness depending on

[1] In our previous work outlining the attention-appraisal model of alexithymia (Preece et al., 2017, 2020a), we discussed emotion regulation more generally, rather than noting how alexithymia might be expected to impact each of the identification, selection, implementation, and monitoring stages of emotion regulation. This is because the main focus of the earlier work was on understanding alexithymia, rather than an explicit focus on its relationships with emotion regulation. In this paper, we use the opportunity to extrapolate more, in the context of the theoretical models outlined above, on how alexithymia could be expected to be associated with emotion regulation.

the specific context (e.g., Sheppes et al., 2015). At the *implementation* stage, people high in alexithymia may be less practiced at effectively implementing adaptive strategies in their context. Finally, at the *monitoring* stage, their impaired capacity to discern nuanced emotional states (e.g., Lane & Schwartz, 1987) should mean it is more difficult to interpret the impact of an emotion regulation strategy and subsequently make appropriate decisions on whether to continue, stop, or switch emotion regulation strategies (Preece et al., 2017, 2020a).

Existing empirical work, whilst limited in scope, appears to support these predictions. Over the past two decades, alexithymia has been consistently associated with poorer overall emotion regulation ability (for a review, see Luminet & Zamariola, 2018), as operationalised by self-report measures like the Difficulties in Emotion Regulation Scale or the Perth Emotion Regulation Competency Inventory (e.g., Pandey et al., 2011; Da Silva et al., 2017; Di Tella et al., 2020; Preece et al., 2018a; Venta et al., 2012). However, data on the precise difficulties at specific stages of emotion regulation (i.e., identification, selection, implementation, or monitoring phases) are more limited.

We know of no alexithymia studies that have directly examined the identification stage, six studies that have examined links between overall alexithymia and use of specific strategies at the selection stage (Preece et al., 2018a, 2020c; Layoyaux et al., 2015; Swart, 2009; Stasiewicz et al., 2012; Weiss et al., 2012), three studies for the implementation stage (Pollatos & Gramann, 2012; van der Velde et al., 2014; Walker et al., 2011), and no studies for the monitoring stage. Of the six studies that have examined overall alexithymia and use of specific emotion regulation strategies at the selection stage, all have used the self-report Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) to focus on people's use of two strategies: cognitive reappraisal (i.e., changing the way one thinks about a situation to change its emotional impact) and expressive suppression (i.e., inhibiting behavioral expression of the emotion). Most of these studies (Preece et al., 2018a, 2020c; Layoyaux et al., 2015; Swart, 2009) found alexithymia to be significantly associated with less usage of cognitive reappraisal and more usage of expressive suppression (though Stasiewicz et al., [2012] found a correlation only with increased expressive suppression, and Weiss et al. [2012] found no significant correlations).

In the broader emotion field, cognitive reappraisal is considered a generally adaptive strategy (i.e., linked with good long-term outcomes) and expressive suppression a generally maladaptive strategy (i.e., linked with poor long-term outcomes; Gross & John, 2003; Aldao et al., 2010). As such, findings to date are broadly consistent with the notion that people high in alexithymia select less effective strategies and thus manifest difficulties at the selection stage. The three available studies on the implementation stage have so far found more mixed results. Such studies have examined neural activation patterns as markers of regulation performance, typically focused on cognitive reappraisal and expressive suppression implementation in laboratory settings (Pollatos & Gramann, 2012; Walker et al., 2011; van der Velde et al., 2014). Pollatos and Gramann (2012) found that individuals high in alexithymia, as compared to those with low alexithymia, were less effective at implementing cognitive reappraisal, but Walker et al. (2011) and van der Velde et al. (2014) did not. Similarly, Walker et al. (2011) found that individuals high in alexithymia were more effective at implementing expressive suppression (perhaps because they may be more practiced at using this generally maladaptive avoidant-type strategy), though van der Velde et al. (2014) found no differences and Pollatos and Gramann (2012) did not examine this strategy.

The Present Study

Whilst most work to date has focused on the selection stage, key limitations in the available studies still necessitate additional work in this domain, particularly given the central role that strategy selection plays within the process model of emotion regulation in influencing downstream well-being outcomes (Gross, 2015). First, the two emotion regulation strategies that have been

examined so far (cognitive reappraisal and expressive suppression) constitute only a limited portion of the emotion regulation strategies that can be used in daily life. People regularly use a wide variety of cognitive and behavioral strategies to regulate their emotions, with adaptive emotion regulation requiring flexible usage of the right strategies for the right contexts (Aldao et al., 2015; Sheppes et al., 2011). For example, other emotion regulation strategies like rumination, acceptance, problem solving, and behavioural withdrawal/avoidance have been widely studied outside the alexithymia field, with important implications for psychopathology symptoms (e.g., Aldao et al., 2010). Thus, studies assessing a greater breadth of emotion regulation strategies are required to provide a fuller account of the emotion regulation patterns characterizing alexithymia. Second, and crucially, none of the available studies on the selection stage have controlled for participants' current levels of distress. Alexithymia is strongly correlated with psychopathology symptoms and is highly prevalent among psychiatric samples (Taylor et al., 1999). As such, if current distress levels are not controlled in analyses, it is possible that some of the observed emotion regulation patterns may just be characteristic of participants that are generally psychologically unwell (e.g., Aldao et al., 2010) or who tend to experience more negative affect (e.g., Sheppes et al., 2014), rather than being attributable to alexithymia specifically (for further discussion of this issue, see Leising et al., 2009; Preece et al., 2020b; Marchesi et al., 2014).

Therefore, the aim of this study was to focus comprehensively on the links between alexithymia and choices at the strategy selection stage of emotion regulation: examining whether people with high, average, or low levels of alexithymia differ systematically in the types of emotion regulation strategies they typically select and use. To this end, we explored emotion regulation profiles in terms of a wide range of cognitive and behavioral emotion regulation strategies (i.e., across 16 strategy/subscale scores), and controlled for participants' levels of current distress in our analysis. We anticipated, based on our conceptual model of alexithymia and emotion regulation (Gross, 2015; Preece et al., 2017), that participants with high levels of alexithymia would tend to select fewer adaptive and more maladaptive emotion regulation strategies.

Method

Participants and Procedure

Our sample comprised 501 adults from the United States (US). This sample was recruited from the general community by an online survey company (Qualtrics Panels) to be representative of the US adult population in terms of gender (50.3% female, 49.7% male), age (*M*=46.92, *SD*=17.37, range = 18-82 years), and geographic region (21.4% Midwest, 20.2% Northeast, 38.9% South, 19.6% West). College (44.0%) or high school (25.9%) were the most common education levels. Most participants (92.0%) were not presently college students. In terms of race, most were White (79.6%), Black (7.6%) or Asian (4.0%). Key inclusion/exclusion criteria for the sample were that participants needed to be living in the US and be aged 18+ at the time of the study. All participants completed a battery of psychometric self-report questionnaires as part of an online survey.

Materials

The questionnaire battery included two measures of alexithymia, three measures of emotion regulation strategy use, and one measure of psychological distress.

Perth Alexithymia Questionnaire (PAQ). The PAQ (Preece et al., 2018b) is a 24-item self-report measure. Items are answered on a seven-point Likert scale, with higher scores indicating higher alexithymia (e.g., "When I'm feeling bad, I can't tell whether I'm sad, angry, or scared"). Several DIF, DDF, and EOT facet scores and a total scale score can be derived. The PAQ has demonstrated good validity and reliability (e.g., Greene et al., 2020) and all subscale and total scale scores had good internal consistency in our sample ($\alpha \geq .80$).

Toronto Alexithymia Scale-20 (TAS-20). The TAS-20 (Bagby et al., 1994) is a 20-item self-report measure. Items are answered on a five-point Likert scale, with higher scores indicating higher alexithymia (e.g., "It is difficult for me to find the right words for my feelings"). DIF, DDF, and EOT facet scores and a total scale score can be derived. The TAS-20 has generally demonstrated good validity and reliability, though the EOT subscale usually has low reliability (e.g., Kooiman et al., 2002). All scores except the EOT subscale ($\alpha = .55$) had good internal consistency ($\alpha \geq .70$) in our sample.

Emotion Regulation Questionnaire (ERQ). The ERQ (Gross & John, 2003) is a 10-item measure of how frequently people use two specific strategies to regulate their emotions: *cognitive reappraisal* (e.g., "I control my emotions by changing the way I think about the situation I'm in") and *expressive suppression* (e.g., "I control my emotions by not expressing them"). Separate subscale scores are derived for each strategy. Items are answered on a seven-point Likert scale, with higher scores indicating more frequent use of that strategy. The ERQ has demonstrated good validity and reliability (e.g., Preece et al., 2020c), with all subscale scores having good internal consistency in our sample ($\alpha \geq .70$).

Cognitive Emotion Regulation Questionnaire (CERQ). The CERQ (Garnefski & Kraaij, 2007) is a 32-item measure of how frequently people use nine different cognitive strategies to regulate their emotions in response to a negative event. Separate subscale scores are derived for each strategy: *self-blame* (e.g., "I feel that I am the one to blame for it"), *acceptance* (e.g., "I think that I have to accept that this has happened"), *rumination* (e.g., "I often think about how I feel about what I have experienced"), *positive refocusing* (e.g., "I think of nicer things that what I have experienced"), *refocus on planning* (e.g., "I think of what I can do best"), *positive reappraisal* (e.g., "I think I can learn something from the situation"), *putting into perspective* (e.g., "I think that it all could have been much worse"), *catastrophizing* (e.g., "I often think that what I have experienced is much worse than what others have experienced"), and *other blame* (e.g., "I feel that others are to blame for it"). Items are answered on a five-point Likert scale, with higher scores indicating more frequent use of that strategy. The CERQ has demonstrated good validity and reliability (e.g., Garnefski & Kraaij, 2007) and all subscale and total scale scores had good internal consistency in our sample ($\alpha \geq .70$).

Behavioral Emotion Regulation Questionnaire (BERQ). The BERQ (Kraaij & Garnefski, 2019) is a 20-item self-report measure of how frequently people use five different behavioural strategies to regulate their emotions in response to a negative event. Separate subscale scores are derived for each strategy: *seeking distraction* (e.g., "I engage in other, unrelated activities"), *withdrawal* (e.g., "I avoid other people"), *actively approaching* (e.g., "I try to do something about it"), *seeking social support* (e.g., "I look for someone to comfort me"), and *ignoring* (e.g., "I move on and pretend that nothing happened"). Items are answered on a five-point Likert scale, with higher scores indicating more frequent use of that strategy. The BERQ has demonstrated good validity and reliability (e.g., Kraaij & Garnefski, 2019) and all subscale and total scale scores had good internal consistency in our sample ($\alpha \geq .70$).

Depression Anxiety Stress Scales-21 (DASS-21). The DASS-21 (Lovibond & Lovibond, 1995) is a 21-item self-report measure of depression, anxiety, and stress symptoms experienced in the last week. Psychometric studies suggest that it is best represented by a total scale score as an overall marker of psychological distress (e.g., Osman et al., 2012). Items are answered on a four-point Likert scale, with higher scores indicating more severe symptoms. The DASS-21 has demonstrated good validity and reliability (e.g., Osman et al., 2012), and its total scale score had good internal consistency in our sample ($\alpha = .96$).

Analytic Strategy

Data Preparation. All analyses were conducted using SPSS 28. To categorise our full sample's ($N = 501$) alexithymia levels for subsequent analysis, alexithymia scores were first

combined from the two alexithymia questionnaires (PAQ and TAS-20). This approach aligns with best-practice recommendations within the field to ideally utilise a multi-measure approach to alexithymia assessment (e.g., Bagby et al., 2006). Specifically, we conducted a factor analysis (principal axis factoring; specified to extract one factor) on all the PAQ and TAS-20 subscale scores, with the extracted latent "alexithymia" factor (eigenvalue = 4.874) accounting for 60.92% of the variance. Compared to simply using the raw scores of an individual measure, this extraction process results in a latent factor score presumed to reflect the alexithymia construct more accurately (i.e., by minimising the influence of the intricacies of each individual measure and partialling out error variance).

Participants' scores on this latent alexithymia score were then used to categorise participants into quantile groups of alexithymia severity: the bottom 25% were categorised into the *low alexithymia* group (*n* = 125; PAQ total *M[SD]* = 38.18[9.33]; TAS-20 total *M[SD]* = 34.36[5.94]), the middle 25% into the *middle/average alexithymia* group (*n* = 125; PAQ total *M[SD]* = 75.46[10.44]; TAS-20 total *M[SD]* = 49.01[7.62]), and the top 25% into the *high alexithymia* group (*n* = 125; PAQ total *M[SD]* = 108.79[15.54]; TAS-20 total *M[SD]* = 62.55[7.42]).[2] These 3 groups differed significantly in their alexithymia levels (ANOVA *p*s < .001, partial η^2 > .72), thus supporting the validity of the groupings. Organising participants into alexithymia groups in this manner is often done in the alexithymia field (e.g., Parker et al., 1993), and we utilised it here to facilitate group comparison analyses where we could control for other key variables as covariates (i.e., participants levels of distress) to isolate the effect of alexithymia more confidently.[3]

Main Analysis. To examine whether emotion regulation strategy use differed among the alexithymia groups (low, average, high), we conducted a Multivariate Analysis of Covariance (MANCOVA) where the 16 emotion regulation strategy scores (ERQ, CERQ, and BERQ subscale scores) were the dependent variables, and alexithymia group was the independent variable. Participant demographics (gender, age, educational level) and current levels of psychological distress (DASS-21 total scores) were entered as covariates to control for their potential confounding effects (e.g., Leising et al., 2009), and thus more clearly isolate the effect of alexithymia. In the event of a significant main effect for the overall MANCOVA, follow-up ANCOVAs were then conducted for each individual strategy score, and in the event of a significant ANCOVA, pairwise comparisons were inspected to determine the source of the effect. An *a priori* power analysis using G*Power 3.1.9.7 indicated that for a medium effect size (f^2 = .15; α = .05; power level = .80), a total sample size of 99 would be required. Thus, we judged our sample size to be sufficient.

Results

The MANCOVA was performed using the following emotion regulation scores as the dependent variables: *ERQ cognitive reappraisal*, *ERQ expressive suppression*, *CERQ self blame*, *CERQ acceptance*, *CERQ rumination*, *CERQ positive refocusing*, *CERQ refocus on planning*, *CERQ positive reappraisal*, *CERQ putting into perspective*, *CERQ catastrophising*, *and CERQ other blame*, *BERQ seeking distraction*, *BERQ withdrawal*, *BERQ actively approaching*, *BERQ seeking social support*, and *BERQ ignoring*. This analysis highlighted, at the multivariate level, that there was an overall

[2] We used three 25% quantiles so that there was a larger gap in alexithymia severity between each group (as opposed to using four 25% quantiles, or three 33.3% quantiles), so as to maximise differentiation between the categories. With respect to the middle 25% quantile, the midpoint of this quantile was centered around the median score.

[3] In the interest of completeness, results using an alternative analysis approach (a multiple regression analysis) where alexithymia is treated as a continuous variable, are also presented in the supplementary materials (see Supplementary Table S2). These results indicated a broadly similar pattern of findings, though with fewer strategies identified as unique predictors (likely because of shared variance between many of the predictors in the model, e.g., the different forms of cognitive reappraisal assessed by the ERQ and CERQ).

difference between the alexithymia groups on a linear composite of these 16 emotion regulation subscale scores, $F(32, 708) = 4.775$, $p < .001$, partial $\eta^2 = .177$. Age, education, and current distress levels were significant covariates ($ps < .05$, partial $\eta^2 = .073$-$.473$).

Follow-up ANCOVAs highlighted that, after controlling for gender, age, education, and current distress levels, significant differences between the alexithymia groups were present for 10 of the 16 strategy scores: *ERQ cognitive reappraisal* ($p = .001$, partial $\eta^2 = .035$), *ERQ expressive suppression* ($p < .001$, partial $\eta^2 = .188$), *CERQ positive refocusing* ($p = .018$, partial $\eta^2 = .022$), *CERQ refocus on planning* ($p < .001$, partial $\eta^2 = .062$), *CERQ positive reappraisal* ($p < .001$, partial $\eta^2 = .073$), *CERQ putting into perspective* ($p < .028$, partial $\eta^2 = .019$), *BERQ withdrawal* ($p = .003$, partial $\eta^2 = .030$), *BERQ actively approaching* ($p < .001$, partial $\eta^2 = .086$), *BERQ seeking social support* ($p < .001$, partial $\eta^2 = .037$), and *BERQ ignoring* ($p < .001$, partial $\eta^2 = .060$). No significant differences were present for *CERQ self-blaming*, *CERQ other blaming*, *CERQ acceptance*, *CERQ rumination*, *CERQ catastrophizing*, or *BERQ seeking distraction* ($ps > .05$).

Pairwise comparisons indicated that, compared to the low and/or medium alexithymia groups, people in the high alexithymia group tended to report significantly higher usage of generally maladaptive emotion regulation strategies (*ERQ expressive suppression*, *BERQ withdrawal*, *BERQ ignoring*), and significantly lower usage of generally adaptive emotion regulation strategies (*ERQ cognitive reappraisal*, *CERQ positive refocusing*, *CERQ refocus on planning*, *CERQ positive reappraisal*, *CERQ putting into perspective*, *BERQ actively approaching*, *BERQ seeking social support*). Estimated marginal means for the low, medium, and high alexithymia groups are displayed in Table 1, and significance values for each pairwise comparison are provided in Supplementary Table S1.

---Insert Table 1 about here ---

Discussion

Our aim in this study was to examine whether people with high, average, or low levels of alexithymia differ systematically in their emotion regulation strategy profiles. As anticipated, we found significant differences across a comprehensive set of cognitive and behavioral strategies, with people high in alexithymia generally selecting more maladaptive strategies and fewer adaptive strategies than people medium or low in alexithymia.

Cognitively, consistent with most previous work that had focused on cognitive reappraisal (e.g., Preece et al., 2018a, 2020c; Layoyaux et al., 2015; Swart, 2009), we found the high alexithymia group reported using significantly fewer cognitive-reappraisal type strategies (i.e., *ERQ cognitive reappraisal*, *CERQ positive refocusing*, *CERQ refocus on planning*, *CERQ positive reappraisal*, *CERQ putting into perspective*). Such strategies are a cornerstone of contemporary cognitive-behavioral therapy approaches (Beck, 1997) and are generally considered adaptive due to widespread evidence linking them to salutary long-term outcomes (e.g., Gross & John, 2003). Importantly, our novel study extends on this past work by also examining a range of other cognitive strategies. In this context, it is noteworthy that whilst high alexithymia individuals used significantly fewer of the adaptive cognitive reappraisal strategies, they did not use significantly more of the maladaptive cognitive strategies we assessed; namely rumination, self-blame, other blaming, and catastrophizing. One possibility is that the characteristic disposition of alexithymic individuals to avoid introspection (e.g., Taylor et al., 1999; Brewer et al., 2016) means that they are unlikely to rely on emotion regulation strategies requiring an internal cognitive focus (i.e., explaining why use of these maladaptive cognitive strategies was not elevated).

Behaviorally, the high alexithymia group used significantly more expressive suppression (i.e., inhibiting expression of emotion), which is also consistent with past work (e.g., Preece et al., 2018a; Layoyaux et al., 2015; Stasiewicz et al., 2012). Again, though, we extended on past literature here by examining a range of other behavioural strategies. Among these strategies, individuals with high alexithymia also used more ignoring (i.e., behaving as though nothing is wrong) and withdrawal (i.e., actively avoiding other people). Together with expressive suppression, these constitute three avoidant-type emotion regulation strategies that are generally considered maladaptive because of their links to poor long-term outcomes (e.g., Kraaij & Garneski, 2019; Gross & John, 2003). Moreover, the high alexithymia group used significantly less active problem-solving and seeking of social support—two strategies that are generally considered adaptive due to their associations with good outcomes (e.g., Aldao et al., 2010; Kraaij & Garneski, 2019). Thus, the alexithymic profile of behavioral emotion regulation in our sample appeared to be centrally characterized by emotional avoidance (see also, Panayiotou et al., 2015; Coriale et al., 2012).

Our findings thus suggest that patterns of avoidant-type emotion regulation strategy use in alexithymia are broader than just expressive suppression, extending also to avoidance of social interaction and problem-solving in the context of emotions. Conceptually, as difficulties identifying and describing feelings are core components of alexithymia (Sifneos, 1973), it is possible that these difficulties discourage or restrict high alexithymia individuals from seeking out others and trying to express their emotions (i.e., as they are unsure what they are feeling in the first place and how to accurately talk about it with others; Vanheule et al., 2007). In turn, it seems possible that avoidant emotion regulation tendencies could further entrench alexithymic difficulties, as one garners little practice developing emotion expression and understanding skills (see also, Lane & Schwartz, 1987).

Taken together, our findings are consistent with the predictions of the process model of emotion regulation (Gross, 2015) and attention appraisal model of alexithymia (Preece et al., 2017). These frameworks predict that high levels of alexithymia should impair appropriate selection of emotion regulation strategies (i.e., impairment at the selection stage of emotion regulation in the process model, as alexithymia limits the quality of information about an emotion that an individual has upon which to base their strategy selection decisions; Gross, 2015), a prediction borne out in our data across both cognitive and behavioral domains of emotion regulation. Importantly, unlike previous work, we controlled for distress levels in our analyses, thus increasing confidence that these patterns can be linked to people's levels of alexithymia specifically, rather than just their overall level of psychological unbeing. That said, given the scarcity of other existing data in the alexithymia field on strategies outside of cognitive reappraisal and expressive suppression (Luminet & Zamariola, 2018), it will be important for future research to replicate our findings.

The observed patterns may have important clinical implications, particularly given the high relevance of alexithymia and emotion regulation to affective disorders (e.g., Taylor et al., 1999). We have previously shown via modelling of direct and indirect effects that a core pathway linking alexithymia to affective symptoms is an indirect link through emotion regulation difficulties (see Preece et al., 2022); that is, alexithymia is associated with emotion regulation difficulties, which are in turn associated with affective symptoms.

The present study helps to delineate the precise nature of these emotion regulation difficulties, and by extension, how they might be targeted in psychotherapy. Our results suggest that emotion-regulation based therapies with people high in alexithymia may benefit from a focus specifically on increasing their usage of cognitive reappraisal, active problem solving, and seeking of social support, and decreasing their usage of expressive suppression, ignoring, and behavioral withdrawal (e.g., via tailored cognitive behavior therapy approaches; Barlow et al., 2017; Mennin & Fresco, 2014). Equally, in the context of our conceptual framework, we consider that such treatments are likely to benefit from including an explicit focus on reducing alexithymia (Preece et

al., 2017). If alexithymia does indeed impair subsequent emotion regulation selection decisions, then it follows that reducing alexithymia should help (and may to some extent be necessary) to facilitate more optimal emotion regulation (for discussions of alexithymia treatment approaches, see Preece et al., 2017; Taylor et al., 1999; Samur et al., 2013).

Limitations and Future Directions

Whilst our study helps to clarify the links between alexithymia and emotion regulation, several limitations should be noted. First, we only examined the selection stage of emotion regulation, and as such cannot comment from our data on the identification, implementation, or monitoring stages of the process model (Gross, 2015). Second, we exclusively used psychometric self-report questionnaires. Whilst these questionnaires are all well-validated and it is a popular assessment approach in the field, future work might benefit from incorporating a multi-modal assessment approach (i.e., also utilizing interview-based or lab-based measures of emotion regulation; Werner et al., 2011; Sheppes et al., 2011). Third, whilst we assessed a greater breadth of emotion regulation strategies than has previously been done in the alexithymia field, it was not an exhaustive list. This strategy breadth issue is to some extent difficult to resolve with currently available psychometric measures, however, future work using ecological momentary assessment (EMA) techniques may help. Outside the alexithymia field, EMA studies have been used to successfully map deficits across all stages of emotion regulation (i.e., identification, selection, implementation, and monitoring; Visser et al., 2018), and EMA procedures could be adapted to assess a wide range of regulation strategies. Fourth, whilst we have discussed emotion regulation strategies here in terms of being generally adaptive or maladaptive (as is commonly done in the emotion regulation field when assessing habitual use of emotion regulation strategies; e.g., Gross, 2015), it bears noting that the adaptiveness of a strategy can vary meaningfully depending on the context in which it is used (Aldao et al., 2015). Future research with an EMA approach may also be well-suited to capturing more proximal and context-specific changes in emotion regulation. Finally, our sample was comprised of primarily white general community adults living in a single Western country (United States). Because the adaptiveness of emotion regulation strategies has been shown to vary across cultures, ages, and clinical populations (e.g., Soto et al., 2011), future work will be necessary to replicate and extend our findings in more diverse populations.

Conclusions

Our data suggest that people with high levels of alexithymia tend to rely on a more maladaptive set of emotion regulation strategies, characterized centrally by emotional avoidance across domains of emotional expression, social interaction, and problem solving. As such, our results support the specifications of the *process model of emotion regulation* (Gross, 2015) and *attention-appraisal model of alexithymia* (Preece et al., 2017), and highlight that at least some of the emotion regulation difficulties associated with alexithymia can be attributed to deficits at the selection phase of emotion regulation.

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Table 1. Estimated Marginal Means for the Low, Medium, and High Alexithymia Groups in Terms of Scores on the 16 Emotion Regulation Strategy Subscales

	Low Alexithymia (n = 125)		Medium/Average Alexithymia (n = 125)		High Alexithymia (n = 125)	
Scales	Estimated marginal mean	Standard error	Estimated marginal mean	Standard error	Estimated marginal mean	Standard error
ERQ						
Cognitive reappraisal	**30.81**	**.69**	**28.26**	**.66**	**27.11**	**.72**
Expressive suppression	**11.71**	**.46**	**15.88**	**.44**	**17.95**	**.48**
CERQ						
Self-blame	10.52	.32	10.20	.31	11.11	.34
Acceptance	12.04	.31	11.89	.30	12.20	.33
Rumination	11.01	.31	11.09	.30	11.40	.33
Positive refocusing	**11.62**	**.37**	**10.18**	**.36**	**10.63**	**.39**
Refocus on planning	**14.44**	**.35**	**12.32**	**.33**	**12.21**	**.37**
Positive reappraisal	**14.47**	**.37**	**12.03**	**.36**	**11.95**	**.39**
Putting into perspective	**13.01**	**.36**	**11.57**	**.35**	**11.83**	**.38**
Catastrophizing	8.56	.31	9.76	.30	9.52	.32
Other blame	7.46	.26	8.10	.25	7.94	.27
BERQ						
Seeking distraction	11.98	.33	11.57	.32	11.61	.35
Withdrawal	**9.45**	**.34**	**10.54**	**.32**	**11.16**	**.35**
Actively approaching	**13.65**	**.34**	**11.37**	**.32**	**10.90**	**.35**
Seeking social support	**11.00**	**.39**	**9.34**	**.37**	**8.97**	**.40**
Ignoring	**7.962**	**.34**	**8.87**	**.33**	**10.51**	**.36**

Note. Bolded scale scores indicate that the high alexithymia group was significantly different ($p < .05$) from the low and/or medium alexithymia groups on that score. Estimated marginal means derived from a MANCOVA (estimated marginal means are mean scores adjusted to control for covariates within the model). Covariates in this model were set at the following values: Gender = .52 (female = 0, male = 1), Age = 46.72, Education = 5.55, DASS-21 total score = 15.79

Highlights

- The process model predicts that alexithymia should impair emotion regulation
- We examined the emotion regulation strategy use profiles characterizing alexithymia
- Alexithymia was characterized by less use of cognitive reappraisal, approaching problems, and seeking social support.
- Also, more use of expressive suppression, behavioural withdrawal, and ignoring.
- People with high alexithymia use a less adaptive profile of emotion regulation strategies, thus providing targets for intervention