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Associations Between Emotion Regulation Difficulties, Eating Disorder Symptoms, Non-Suicidal Self-Injury, and Suicide Attempts in a Heterogeneous Eating Disorder Sample

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Abstract

Background—This study examined the associations between specific dimensions of emotion dysregulation and eating disorder (ED) symptoms and behaviors, non-suicidal self-injury (NSSI), and suicide attempts in a heterogeneous ED sample.

Methods—Participants (N = 110) completed the Difficulties in Emotion Regulation Scale (DERS), the Eating Disorder Examination Questionnaire (EDE-Q), and self-reported the presence of lifetime NSSI and a lifetime suicide attempt.

Results—The EDE-Q global score, a primarily cognitive measure of ED symptoms, was significantly positively correlated with DERS strategies, clarity, and awareness subscale scores and DERS total score (ps < 0.01). Only the strategies subscale was uniquely positively associated with EDE-Q global score in a multivariate regression analysis. There was no association between the frequency of binge eating or frequency of driven exercise and any of the DERS subscale scores or total score (ps > 0.01). Frequency of purging was significantly, positively associated with DERS impulse subscale score and total score (p < 0.01). None of the DERS subscale scores were significantly different between those with and without NSSI or between those with and without a lifetime suicide attempt (ps > 0.01).

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Conclusions—Findings indicate that in a heterogeneous ED sample, emotion regulation deficits are more strongly associated with cognitively-oriented symptoms of EDs than behavioral symptoms such as a binge eating, purging, driven exercise, NSSI, or suicide attempts.

Keywords

Eating disorders; suicide; non-suicidal self-injury; self-harm; emotion regulation

A growing theoretical and empirical literature indicates that eating disorders (EDs) are associated with problems in emotion regulation [1–3]. Emotion regulation theories posit that individuals with EDs experience deficits in emotion regulation and, therefore, engage in ED behaviors (e.g., binge eating, purging) as a means of regulating aversive affect in the absence of more adaptive emotion modulation strategies. In line with such models, difficulties with emotion regulation are elevated in ED groups compared to control groups and other psychiatric disorders [4–7], elevated negative affect is a common precipitant of ED behaviors [8], and reductions in negative affect have been demonstrated following ED behaviors [9, 10].

The deficits in emotion regulation observed in individuals with EDs have also been hypothesized to underlie the high prevalence self-injurious thoughts and behaviors in this population [11]. Individuals with EDs frequently engage in non-suicidal self-injury (NSSI), with prevalence estimates ranging from 15.3% to 55.2% [11–13]. Similar emotion regulation functions have been posited for ED behaviors and NSSI (i.e., both types of behavior may serve to regulate negative affect in the moment) [11, 14–17]. Additionally, there is a high prevalence of suicide attempts in individuals with EDs, with lifetime prevalence estimates ranging from 3.0% to 40% [18–21]. The majority of research indicates that both NSSI and suicide attempts are more prevalent in individuals who engage in purging behaviors [12, 20, 22], which are also associated with deficits in emotion regulation.

However, emotion regulation is a multifaceted construct. According to the multidimensional model outlined by Gratz and Roemer (2004), effective emotion regulation is characterized by the ability to: (a) recognize, understand, and accept emotions; (b) identify and utilize adaptive strategies to alter emotional states; (c) maintain behavioral control when distressed; and (d) temporarily experience aversive emotional experiences in order to work towards larger goals [23]. Problems in any of these areas can potentially contribute to poor emotion regulation ability and specific emotion regulation impairments may differ by clinical concern [24]. However, the ED literature to date has generally focused on the impact of global, rather than specific, deficits in emotion regulation on ED symptoms. The few studies that have examined specific dimensions of emotion regulation in ED populations have found nearly all dimensions to be related to global cognitive ED symptoms, with the greatest evidence base suggesting deficits in emotional awareness [6, 25–27]. Further, impulsivity and the inability to engage in goal-directed behavior while distressed have been linked to specific ED behaviors, including binge eating and purging [25, 26]. The existing studies examining the role of varying dimensions of emotion regulation have generally been conducted with non-clinical groups [25] or specific diagnostic groups [26, 27], rather than heterogeneous ED groups. However, there is growing interest in examining symptoms and

behaviors transdiagnostically in order to identify common mechanisms across a range of severity and presentation [28]. Therefore, there is a need to examine the association between specific emotion regulation deficits and symptomology in heterogeneous ED groups in order to determine which deficits correspond with specific transdiagnostic ED concerns. This potential association is particularly important given that certain deficits may have more relevance to specific types of ED symptoms and, consequently, need greater focus in treatment.

There has been limited research examining whether specific dimensions of emotion regulation are associated with NSSI and suicide attempts in heterogeneous ED samples and the findings have been mixed. In one recent study of individuals with bulimic-spectrum disorders (individuals with binge eating and/or purging), those with a lifetime suicide attempt or lifetime NSSI demonstrated greater deficits in several dimensions of emotion regulation, especially non-acceptance of emotional states, difficulties engaging in goal-directed behavior under distress, and limited access to emotion regulation strategies, than those with no lifetime suicide attempt or NSSI [29]. However, another recent study with a broader heterogeneous ED sample that also included restricting eating disorders did not find any differences in dimensions of emotion regulation among those with and without lifetime NSSI; this study did not examine the association between deficits in emotion regulation and suicide attempts [30]. Therefore, additional research is needed to clarify the discrepant findings regarding associations between dimensions of emotion regulation and NSSI and to replicate one initial finding examining dimensions of emotion regulation and suicide attempts in EDs.

It is important to determine whether specific dimensions of emotion regulation are associated with different behavioral concerns in order to more effectively tailor emotion regulation interventions to address specific problem behaviors in treatment of individuals with EDs. Given that previous studies have examined the role of dimensions of emotion regulation in non-clinical groups [25] or specific diagnostic groups [26, 27], the first aim of the study was to examine the association between specific dimensions of emotion dysregulation and ED symptoms in a heterogeneous ED sample. The second aim of the study was to examine the association between dimensions of emotion regulation and NSSI in a heterogeneous ED sample in an effort to clarify previous discrepant findings [29, 30]. A third aim of the study was to examine the association between specific dimensions of emotion dysregulation and suicide attempts in an ED sample, given that only one previous study has examined this association. Therefore, in this study we sought to expand upon prior research by examining the associations between specific dimensions of emotion dysregulation and ED symptoms and behaviors in a heterogeneous, treatment-seeking ED sample and replicate preliminary investigations between NSSI and suicide attempts in heterogeneous ED samples. Given the limited prior research in this area, this study was exploratory in nature. Although we hypothesized that broadly defined emotion regulation would be associated with global ED severity, ED behaviors, NSSI, and suicide attempts, we had no a priori hypotheses about which specific dimensions of emotion dysregulation would be associated with global ED severity, ED behaviors, NSSI, or suicide attempts.

2. Material and methods

2.1. Participants and Procedures

Participants (N = 110; 93.6% female; mean age = 33.5, SD = 12.2) were recruited from a national ED treatment facility through advertisements in clinic waiting rooms and on social media. The advertisements stated that the study was about "understanding the emotional experiences of individuals with eating disorders." Inclusion criteria included age 18 years or older, currently in ED treatment, and ability to read and write English.

Potential participants were able to go to the study's website where they could read the study description and consent form and receive contact information for the study PI. Individuals who were still interested in participating after reading the introductory information electronically signed the consent form, certified that they were in active ED treatment at the specified treatment facility, and then completed a series of questionnaires online. The study was designed to be completely online as the anonymity of online administration and questionnaire data collection has been demonstrated to increase self-disclosure of sensitive information such as ED symptomatology and suicidality [31, 32]. The study procedures were approved by the university's IRB.

2.2 Measures

2.2.1 Difficulties in Emotion Regulation Scale (DERS; [23])—The DERS is a 36 item scale that assesses emotion regulation concerns. The DERS provides a total score and six subscale scores: nonacceptance (problems with emotional acceptance), strategies (limited access to adaptive emotion regulation skills), goals (difficulty with goal-directed behavior when distressed), impulse (difficulty controlling behaviors when upset), clarity (poor emotional differentiation), and awareness (limited emotional identification). Higher scores indicate greater problems with emotion regulation. Internal consistency in this sample was good (all alphas .84).

2.2.2 Eating Disorder Examination-Questionnaire (EDE-Q; [33])—The EDE-Q is a 28 item self-report questionnaire that assesses ED symptoms over the past 28 days. The EDE-Q has previously been demonstrated to have good psychometric properties and been shown to have adequate convergence with the interview-based Eating Disorder Examination (EDE; [34]). The global scale (EDE-Q global; $\alpha = 0.92$) reflects overall ED severity and is primarily a measure of ED cognitions related to restraint, eating concerns, weight concerns, and shape concerns. Count variables for the frequency of objective binge eating episodes, frequency of purging episodes, and frequency of driven exercise in the past 28 days are not included in the EDE-Q global score, but were used in the current study. Participants selfreported their height and weight, which was computed into body mass index (BMI; kg/m²). Probable diagnoses were based on symptoms in the past 28 days using algorithms based on DSM-5 [28] that have previously been demonstrated to have acceptable sensitivity and specificity to diagnoses derived from clinical interviews [35, 36]. The final sample included 10 individuals with probable AN (9.1%), 23 with probable BN (20.9%), 26 with probable BED (23.6%) and 51 with probable Other Specified Feeding and Eating Disorders (46.4%; 5 = subthreshold AN; 30 = subthreshold bulimic spectrum; 16; subthreshold BED).

2.2.3 Lifetime Non-Suicidal Self-Injury—Participants were asked "have you ever actually engaged in non-suicidal self-injury?", which had previously been defined for them as "purposely hurting yourself without wanting to die? (for example, cutting or burning)." Response options were yes or no. This question was adapted from the Self Injurious Thoughts and Behaviors Interview (SITB; [37]).

2.2.4 Lifetime Suicide Attempts—Participants were asked "have you ever made an actual attempt to kill yourself in which you had at least some intent to die?" Response options were yes or no. This question was adapted from the SITBI [37].

2.3 Statistical Analyses

All data management and analyses were conducted using IBM SPSS Version 21. Correlations were used to examine the bivariate association between four primary ED psychopathology measures (EDE global score, frequency of objective binge eating, frequency of purging, frequency of driven exercise), BMI, and the DERS total and subscale scores; Pearson correlations were run for EDE global score and BMI and Spearman rho for the count variables (frequency of objective binge eating, frequency of purging, frequency of driven exercise). Next, Mann-Whitney U tests were conducted and effect sizes were calculated (r = Z/N) to examine differences in emotion regulation difficulties between individuals with and without a lifetime history of NSSI, as well as between those with and without a lifetime history of a suicide attempt. A more conservative alpha of .01 was elected for interpreting significance of the bivariate correlations and Mann-Whitney U tests in order to correct for multiple comparisons.

3. Results

Preliminary analyses revealed that there were no differences in the DERS subscale scores, prevalence of NSSI, or prevalence of suicide attempt by the probable ED diagnoses derived from the EDE-Q (ps > 0.05). Thus, as planned, we conducted all analyses for the present study transdiagnostically.

Descriptive statistics and intercorrelations between DERS subscale scores, total score, ED symptoms, and BMI are presented in Table 1. EDE-Q global score was significantly, positively correlated with DERS strategies, impulse, clarity, and awareness subscale scores and DERS total score with medium correlations (rs > .30, ps < 0.01), such that greater emotion regulation difficulties on these scales were associated with greater global ED symptoms. There were trends towards a positive association between EDE-Q global score and the DERS nonacceptance, and goals subscale sores with small correlations (rs > .20, ps < 0.05). Frequency of purging was significantly, positively associated with the impulse subscale and the DERS total score with small to medium correlations (rho > .26, p < 0.01) and there was a trend towards association with strategies subscale score with a small correlation (rho = .25, p < 0.05). There were no significant associations between frequency of binge eating or driven exercise and any of the DERS scores. Similarly, there were no significant associations between BMI and any of the DERS scores.

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Comparisons between DERS subscale scores and total score between those with a lifetime history of NSSI (n = 56, 50.9%) and those without a lifetime history of NSSI (n = 54, 49.1%) are presented in Table 2. None of the DERS scores significantly differed between those with and those without NSSI at the p < 0.01 level, although there was a trend towards higher impulse in the NSSI group with a small effect size (effect size = .20, p = 0.04). Comparisons between DERS subscale scores and total score between those with a lifetime history of a suicide attempt (n = 22, 20.0%) and those without a lifetime history of a suicide attempt (n = 88, 80.0%) are presented in Table 2. None of the DERS scores significantly differed between those with and those without a lifetime history of a suicide attempt at the p < 0.01 level.

To further evaluate the nature of the associations between emotion dysregulation dimensions and ED symptoms, a follow-up analysis based on the bivariate results was conducted. Specifically, to examine the unique associations of specific emotion regulation difficulties with overall ED symptoms, a multiple regression analysis was performed with the EDE-Q global score as the dependent variable and those DERS subscale scores that were associated with the EDE-Q at a bivariate level (strategies, impulse, clarity, and awareness) as the independent variables. All variables included in this analysis were found to be normally distributed. The overall model was significant ($F_{(4,84)} = 4.836$, p = 0.01) and accounted for 18.7% of the variance. Of the four subscale scores included in the model, only the strategies subscale was significantly uniquely associated with the EDE-Q global score ($\beta = 0.348$, p =0.029).

4. Discussion

This study examined the associations between specific dimensions of emotion regulation concerns and global ED severity, ED behaviors, NSSI, and suicide attempts in a transdiagnostic clinical ED sample. The overall pattern of findings suggests that deficits in emotion regulation are most strongly associated with the EDE-Q global score, a more cognitively-oriented measure, as opposed to frequency of behavioral symptoms such as binge eating, purging, and driven exercise, or lifetime prevalence of NSSI or suicide attempts. Our findings add to a growing literature demonstrating that a range of emotion regulation concerns are related to global ED symptoms that are more cognitively-oriented [26, 27]. These findings partially support emotion regulation models of ED by demonstrating a link between emotion regulation deficits and overall ED symptoms; however, contrary to these models, ED behaviors were not associated with emotion regulation deficits, suggesting that other mechanisms may account for these behaviors.

The EDE-Q global score was associated with deficits in several facets of emotion regulation, including the strategies, impulse, clarity, and awareness subscales, as well as broad emotion regulation. These subscales have been previously associated with the related, interview-based EDE global score in a sample with anorexia nervosa [27] and the strategies subscale was associated with EDE global score in a sample with bulimia nervosa [26]. Thus, a growing body of evidence suggests a similar pattern of deficits in emotion regulation associated with global ED symptoms across ED diagnoses. These findings, taken in concert with previous research [26, 27], suggest that difficulties with identifying and understanding

emotional states, as well as problems selecting adaptive over maladaptive emotion regulation strategies, are associated with cognitively-oriented global ED symptoms. Thus, addressing targets related to these aspects of emotion regulation in ED treatment may assist in reducing overall ED psychopathology.

In the present heterogeneous ED sample, the multivariate analysis revealed that the strategies subscale, which reflects limited access to adaptive emotion regulation skills, was the only subscale score uniquely associated with EDE-Q global score. This finding parallels results from the broader emotion regulation literature, which has found the strategies subscale to uniquely predict symptoms of substance use disorders and depression [38, 39]. In contrast, a prior multivariate analysis using an anorexia nervosa sample revealed only a unique association between emotional awareness and the EDE global score when examining all of the DERS subscale scores and controlling for depression and anxiety [27], whereas no subscale emerged as uniquely associated with the EDE global score in a bulimia nervosa sample examining all of the DERS subscale scores controlling for BMI and full vs subthreshold status[26]. However, despite varying methodologies, across all three samples a medium correlation (> 0.30) was observed between global score and the DERS strategies subscale, providing converging evidence that deficits in accessing adaptive emotion regulation skills may be associated with ED cognitions across diagnoses. These findings suggest that treatments focused on helping patients with EDs develop a variety of strategies to manage emotions may be particularly beneficial.

In contrast to the EDE-Q global score, we found limited associations between emotion regulation problems and frequency of ED behavioral symptoms. None of the DERS scores were significantly associated with binge eating frequency, which replicates findings from a bulimia nervosa sample [26]. Purging frequency was only significantly associated with the impulse subscale and broad emotion regulation, although there was a trend towards a small association between purging frequency and the strategies subscales. The impulse subscale has previously been associated with purging frequency in a sample of anorexia nervosa [27], but not in a sample of bulimia nervosa [26]. Driven exercise frequency was not significantly associated with the goal subscale in a sample of bulimia nervosa [26].

There are several important considerations when interpreting these findings. First, the findings support the literature suggesting that purging behavior is linked with emotion regulation concerns [26, 27] and indicate that impulsivity when distressed may be specifically related to purging behavior [26, 27]. Second, although the finding that deficits in emotion regulation were more strongly associated with EDE-Q global score than ED behaviors may seem initially counterintuitive, as ED behaviors are often conceptualized as attempts to regulate emotions, this finding could in fact support this conceptualization. These results could reflect that individuals who engage in high levels of ED behavior, such as binge eating and driven exercise, may have learned ways to somewhat effectively, albeit maladaptively, regulate their emotions through ED behavior, as such behaviors have been associated with reductions in negative affect [40]. Therefore, binge eating and driven exercise may be less likely to be associated with elevated emotion dysregulation. However,

further research on the connection between emotion regulation concerns and ED behaviors is needed to fully interpret these results.

We found no significant associations between dimensions of emotion regulation or broad emotion regulation problems with lifetime NSSI and thus failed to replicate initial findings of Gomez-Esposita and colleagues (2016). Although our non-significant findings replicate another recent study [30], we were somewhat surprised as emotion dysregulation has been hypothesized to play a central role in the development of NSSI [41] and NSSI has also been conceptualized as a way to regulate emotions [15]. Indeed, the most commonly endorsed motive for engaging in NSSI is to reduce, escape, or avoid aversive affective states [42, 43]. Previous research has demonstrated an association between emotion dysregulation and NSSI in nonclinical [44, 45] and clinical samples [46]. Within EDs, NSSI has been shown to be associated with momentary decreases in negative affect based on ecological momentary assessment [17]. Thus, it is unexpected that in two heterogeneous ED samples emotion regulation has not been associated with lifetime NSSI. In the current sample, there was a trend characterized by a small effect size suggesting greater difficulty with impulse control in the context of distress for individuals who had engaged in NSSI; interestingly, the impulse subscale was not one of the DERS subscales that was associated with NSSI in the recent study by Gomez-Exposito et al. (2016), who found greater deficits in the non-acceptance, goals, and strategies DERS subscales in individuals with bulimic-spectrum disorders with lifetime NSSI versus those with no lifetime NSSI [29]. These findings together suggest that further research is needed to understand the association between mood-dependent impulse control problems and behavioral symptoms among individuals with EDs. Additionally, certain methodological limitations may have contributed to these unexpected findings. Because our assessment of NSSI was based on lifetime experience and our sample was treatment seeking, it is possible that we did not observe differences in emotion regulation if these individuals had received treatment specifically targeting emotion regulation. Further, DERS scores were elevated across the sample in comparison to scores typically observed in healthy samples [44]. Therefore, the data may have been subject to a ceiling effect, preventing distinction of subgroups based on emotion regulation difficulties.

Similarly, no differences in emotion regulation difficulties emerged between participants with and without lifetime suicide attempt. Previous research examining the association between emotion regulation and suicide attempts has found differences between control participants and suicide attempters on the DERS nonacceptance and strategies subscales [47] and a recent study of individuals with bulimic-spectrum disorders indicated elevations on all DERS scales in individuals with versus without a lifetime suicide attempt [29]. However, consistent with our findings, other studies have also failed to show a direct association between emotion regulation and suicide attempts [48, 49]. Although we did not find any significant associations between emotion regulation and suicide attempts in those with small effect sizes towards greater problems on the impulse and clarity subscales in those with a lifetime suicide attempt. These initial findings are consistent with results in two samples of individuals with bulimia nervosa indicating that personality traits associated with emotion regulation are elevated in those with a lifetime suicide attempt [50]. Again, the analyses in the present study may have been limited by the lifetime assessment of suicide attempts as well as potential ceiling effects.

The present study has a number of strengths, including the use of a heterogeneous sample of individuals with a clinical ED. Anonymous online data collection may have resulted in increased self-disclosure of ED symptoms, NSSI, and suicide attempts [31, 32]. However, a few limitations should be noted. As the study was completed online and advertised on social media, it is possible that a participant was not in active ED treatment, despite certifying that they were. All assessments were self-report, and the ED assessment was questionnaire based and only addressed symptom severity in the past 28 days. Additionally, as mentioned above, participants were currently in treatment for their ED and thus may have been receiving treatment actively targeting emotion regulation. Other behaviors that may be associated with emotion regulation and eating disorder symptoms including substance use were not examined. Finally, the data are cross-sectional. Thus, we were unable to establish the temporality of the symptom presentation or examine mechanisms of change related to treatment, emotion regulation, and symptom presentation.

4.1. Conclusions

The present study supports a growing literature indicating that deficits in emotion regulation are associated with ED cognitions and extends these findings by demonstrating this association in a heterogeneous ED sample. Thus, the association between emotion regulation deficits and ED cognitions appears to occur across the full spectrum of EDs. Therefore, targeting emotion regulation may be an important element in ED treatment, regardless of presenting diagnosis. The data in this study do not support a robust association between broad emotion regulation deficits and NSSI or suicide attempts in individuals with EDs, but do indicate that emotion-based impulse control problems may be elevated in individuals with a history of NSSI or suicide attempts. Thus, additional research is needed to determine whether such impulse control difficulties are a mechanism that contributes to the high rate of NSSI and suicide attempts in those with EDs and should be a potential target for treatment and prevention efforts to address suicidality and self-injury among individuals with EDs.

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	DERS nonacceptance	DERS strategies	DERS impulse	DERS goals	DERS clarity	DERS awareness	DERS total	Mean	SD
EDE-Q global	.22 *	.38**	.30	.20*	.33 **	.31**	.37**	3.72	1.24
Binge eating frequency	01	.15	.15	.11	01	03	.05	7 <i>.</i> 77	11.41
Purging frequency	.18	.25 *	.26**	.14	.18	.17	.35 **	4.25	10.84
Driven exercise frequency	.02	.01	.01	06	.15	.17	60.	5.29	8.14
BMI	07	.05	01	02	16	18	14	28.12	11.20
Mean	17.44	21.98	14.62	16.70	14.09	17.23	101.32		
SD	6.92	8.34	5.86	4.71	4.92	6.01	29.71		
Note. DERS, Difficulties in	Emotion Regulation Scale;	EDE-Q, Eating Diso	rder Examination (Questionnaire					
$^{*}_{p < 0.05}$									
$p_{p}^{**} < 0.01$									

Table 2

Comparison of dimensions of DERS subscales by presence of lifetime NSSI and lifetime suicide attempt

	No Lifetime NSSI ($n = 54$)	Lifetime NSSI $(n = 56)$	Mann-Whitney U	z	þ	Effect Size
DERS nonacceptance	16.82 (6.85)	18.00 (7.00)	1186.50	-1.05	0.29	0.10
DERS strategies	20.98 (8.16)	22.96 (8.49)	1095.50	-1.22	0.22	0.12
DERS impulse	13.46 (5.51)	15.78 (6.01)	949.50	-2.08	0.04	0.20
DERS goals	16.16 (4.50)	17.20 (4.89)	1183.50	-1.39	0.17	0.13
DERS clarity	13.51 (4.91)	14.64 (4.90)	1220.00	-1.16	0.25	0.11
DERS awareness	17.12 (5.97)	17.33 (6.11)	1270.00	-0.03	0.97	0.00
DERS total	98.49 (29.55)	104.36 (29.92)	892.50	-1.12	0.26	0.11
	No Lifetime SA ($n = 88$)	Lifetime SA $(n = 22)$	Mann-Whitney U	2	d	Effect Size
DERS nonacceptance	17.22 (6.83)	18.35 (7.42)	762.50	-0.64	0.52	0.06
DERS strategies	21.41 (8.11)	24.42 (9.13)	620.00	-1.38	0.17	0.13
DERS impulse	13.97 (5.68)	17.05 (6.00)	590.50	-2.03	0.04	0.19
DERS goals	16.56 (4.62)	17.23 (5.13)	795.00	-0.78	0.44	0.07
DERS clarity	13.47 (4.84)	16.45 (4.58)	608.00	-2.47	0.01	0.24
DERS awareness	16.76 (5.85)	19.00 (6.45)	660.00	-1.51	0.13	0.14
DERS total	98.99 (29.13)	110.83 (30.96)	508.00	-1.49	0.14	0.14