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Moderators and mediators of outcome in Internet-based indicated prevention for eating disorders

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ABSTRACT

The objective of this study was to investigate moderators and mediators of the effect of an indicated prevention program for eating disorders (ED) on reduction of dysfunctional attitudes and specific ED symptoms. 126 women (M age = 22.3; range 18–33) reporting subthreshold ED symptoms were randomized to the Student Bodies™+ (SB+) intervention or an assessment-only control condition. Assessments took place at pre-intervention, mid-intervention (mediators), post-intervention, and 6-month follow-up. Mixed effects modeling including all available data from all time points were used for the data analysis. Intervention effects on the reduction of binge rate were weaker for participants with higher baseline BMI and for participants with a lower baseline purge rate. Intervention effects on reduction of eating disorder pathology were weaker for participants with higher baseline purge rate and with initial restrictive eating. No moderators of the intervention effect on restrictive eating were identified. An increase in knowledge mediated the beneficial effect of SB+ on binge rate. The results suggest that different moderators should be considered for the reduction of symptoms and change in attitudes of disturbed eating and that SB+ at least partially operates through psychoeducation.

Eating disorders are associated with severe psychological and physical impairments (Miller et al., 2005; Mond, Hay, Rodgers, & Owen, 2012; Roerig, Mitchell, Myers, & Glass, 2002), treatment efficacy is limited and long-term outcome is poor (Steinhausen, 2002; Zipfel, Löwe, Reas, Deter, & Herzog, 2000). Consequently, a number of studies have been undertaken to prevent eating disorders. For some of the programs, the efficacy in reducing specific risk factors for eating disorders (e.g. Zabinski et al., 2001), symptoms of eating disorders (Stice, Rohde, Gau, & Shaw, 2009) or the incidence of full-syndrome or partial eating disorders (Stice, Marti, Spoor, Presnell, & Shaw, 2008), or the incidence of eating disorders in specific subgroups (Taylor et al., 2006) has been demonstrated in randomized controlled trials (RCTs). However, not all of the participants showed the same benefit from the interventions in these studies; a proportion of subjects showed no or very poor response (Jacobi, Völker, Trockel, & Taylor, 2012). Knowledge about variables predicting (non-) response is crucial to tailor more effective interventions for non-responding individuals. One way to better identify these variables in RCTs is by means of moderator analyses (Kraemer, Wilson, Fairburn, & Agras, 2002). According to Kraemer et al. (2002), moderators specify for whom and under what conditions an intervention works (i.e., which baseline characteristics determine the intervention effect on the outcome).

Regardless of the knowledge about the efficacy of preventive interventions, another crucial issue is the fact that little is known about the exact mechanisms through which an intervention might achieve its effects. Such information can be obtained from mediator analyses. Mediators are changes or events occurring after baseline during the ongoing intervention and prior to assessment of outcome. Knowledge about mediators is necessary to identify effective and ineffective parts of interventions in order to optimize both therapeutic and economic aspects of interventions.

For both moderators and mediators, evidence from RCTs in the field of eating disorder prevention is scarce. To our knowledge, only three randomized controlled prevention trials explicitly tried to identify moderators. These studies include a variety of potential moderators (e.g., BMI, ED symptoms, attitudes of disordered eating) as well as a variety of outcomes (e.g., onset of EDs, frequency of ED symptoms, attitudes of disordered eating). One large multicenter prevention trial of an Internet-based prevention program for eating

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disorders, “Student Bodies”, did not demonstrate an overall effect on onset of clinical or subclinical EDs (Taylor et al., 2006). However, the intervention significantly reduced ED onset in the subgroups of women with an elevated baseline BMI and with baseline compensatory behaviors. Stice, Marti, Shaw, and O'Neil (2008), in a comparison of two eating disorder prevention programs with an expressive writing and an assessment-only control condition found that the effect of the dissonance-based thin-ideal reduction program on bulimic symptoms was stronger in women with initially elevated body image distress, baseline bulimic symptoms, and thin-ideal internalization. Similarly, the healthy weight management program showed a stronger effect on bulimic symptoms in women with elevated body image distress, baseline bulimic symptoms, readiness to change, BMI, and emotional eating. In a more recent RCT, Stice, Rohde, Shaw, and Marti (2012) found greater reductions in a composite measure of eating disorder symptoms and BMI for participants with initially elevated symptoms and pressure to be thin in the healthy weight management program compared to an educational brochure control condition.

To date, four studies tried to identify mediators of change in randomized controlled prevention trials. Stice, Presnell, Gau, and Shaw (2007), in a RCT on the efficacy of two eating disorder prevention programs found that change in thin-ideal internalization mediated the effect of the intervention on body dissatisfaction, dieting, negative affect, and bulimic symptoms. A second study by Seidel, Presnell, and Rosenfield (2009), replicated these findings for the effect of intervention on bulimic symptoms. The authors also found that change in body dissatisfaction mediated the intervention effect on bulimic symptoms. Brown, Smith, and Craighead (2010) found that appetite awareness, but not emotional awareness, mediated the positive effect of an eating disorder prevention program on binge eating as well as on eating- and weight-control self-efficacy. A more recent study by Stice, Marti, Rohde, and Shaw (2011) once more demonstrated that the effect of a dissonance-based eating disorder prevention program on body dissatisfaction and on eating disorder symptoms was mediated by a reduction in thin ideal internalization. In addition, the effect of the intervention on reduction of eating disorder symptoms was mediated by a reduction of body dissatisfaction.

In our own most recent prevention trial for women with subthreshold eating disorders (Jacobi et al., 2012), the adapted version of Student Bodies, Student Bodies+ (SB+) was effective in reducing dysfunctional attitudes associated with eating disorders and eating disorder symptoms. Women who participated in SB+ had a larger decrease of dysfunctional attitudes and behaviors at 6 month follow-up and greater reductions of binge eating episodes, purging episodes and restrictive eating than participants in the assessment-only control group. However, preliminary subgroup analyses revealed that the effect of SB+ on ED-related attitudes was larger for participants with baseline binge eating compared to pure restricting participants.

Overall, previous research on moderators and mediators of eating disorder prevention programs focused on variables such as ED symptoms, associated attitudes of EDs, and BMI. In five of the seven studies, a differentiation between the specific ED symptoms is not made because bingeing, purging, and fasting are summarized into one ‘symptom composite’ variable or binge eating and purging behaviors are summarized into the variable “bulimic symptoms”. Three of the studies differentiate between specific symptoms of eating disorders, such as purging behaviors, binge eating or dieting. It seems plausible however, that different symptoms of disordered eating – especially binge eating and dieting – may have different effects as moderator variables and that different mediators can be identified when different symptoms are considered as outcomes. Apart from symptoms of disordered eating, the number of attitudes of disordered eating was primarily limited to internalization of a thin beauty ideal and to different aspects of body dissatisfaction in previous research. Accordingly, moderator and mediator analyses including distinct symptoms of disordered eating and a broader range of attitudes of disordered eating could provide more detailed information about participant characteristics and specific mechanisms of change.

The aim of the present paper is to explore potential moderators and mediators of the effects of SB+ on dysfunctional attitudes and behaviors and on different symptoms of disordered eating such as restrictive eating, binge eating, and purging.

Method

Sample and procedures

Participating women were recruited from four German universities through advertisements offering a program to improve body image, knowledge on healthy eating and exercise, and to maintain a healthy eating pattern even when facing negative emotions and stress. Interested participants completed a short screening questionnaire and, if screened positive, were invited to face-to-face baseline assessments. Subsequently, eligible participants were randomly assigned to the SB+ intervention or the assessment-only control group. Randomization was performed in blocks of 20 subjects to ensure large enough discussion groups for participants in the intervention condition. Assessments took place before randomization (at baseline), at mid-intervention (4 weeks after baseline, only potential mediator variables), at post-intervention (8 weeks after baseline), and at follow-up (6 months after the end of the intervention). Baseline, post-intervention, and follow-up assessments were conducted in face-to-face settings; mid-intervention assessments were obtained through questionnaires sent out via email. The study was approved by the local human subjects committee.

To be included in the study, women had to be between 18 and 35 years of age, have a body mass index (BMI) between 17.5 and 33, and had to report high weight and shape concerns as indicated by scoring >42 on the Weight Concerns Scale (WCS; Grund, 2003; Jacobi, Abascal, & Taylor, 2004). Additionally they were required to have behavioral symptoms of an ED, such as recurrent binge eating and/or compensatory behaviors below the diagnostic threshold, and/or chronic restrictive eating assessed by a modified version of the ED diagnostic section (H) of the Structured Clinical Interview for DSM IV Axis 1 Disorders (SCID; Wittchen, Zaudig, & Fydrich, 1997). We excluded women with a current DSM-IV-based full-syndrome ED in the past 6 months or other severe current psychopathology (e.g., major depression, suicidal ideation, use of psychotropic medication, or alcohol or drug abuse).

126 women were randomized to the SB+ intervention ($N = 64$) or to the assessment only control condition ($N = 62$). At mid-intervention, data from $N = 91$ women (Intervention $N = 40$; Control $N = 51$) were available. $N = 115$ women took part in the post-assessments (Intervention $N = 56$; Control $N = 59$) and $N = 103$ in follow-up assessments (Intervention $N = 51$; Control $N = 52$). Mean age of the women at baseline was 22.3 years (SD = 2.9), mean BMI was 23.6 (SD = 2.7). 6.3% ($N = 8$) reported past ED treatment (4 for AN, 4 for BN) and 21.4% ($N = 27$) fulfilled criteria for a lifetime diagnosis of an ED (17 AN, 8 BN, 2 BED). Table 1 shows means and standard deviations of all symptoms and attitudes by group at each of the time points. Fig. 1 informs about ED symptoms and their combinations in our sample at each of the time points.