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Psychological need satisfaction, control, and disordered eating

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Objectives. Unfulfilled basic psychological needs have been associated with disordered eating behaviours, but the mechanisms underlying that associations are not well understood. This study examined a two-stage path model linking basic psychological need satisfaction to disordered eating behaviours via issues of control.

Methods. Female university students ($N = 323$; $M_{age} = 19.61$), community participants ($N = 371$; $M_{age} = 29.75$), and women who self-reported having been diagnosed with an eating disorder (ED; $N = 41$; $M_{age} = 23.88$) completed measures of psychological need satisfaction (i.e., autonomy and competence), issues of control (i.e., feelings of ineffectiveness and fear of losing self-control [FLC]), and ED pathology.

Results. Path analysis revealed that unsatisfied needs of autonomy and competence were indirectly related to disordered eating behaviours through feelings of ineffectiveness and FLC.

Conclusions. The results indicate that issues of control might be one of the mechanisms through which lack of psychological need satisfaction is associated with disordered eating. Although the model was constructed using cross-sectional data, these findings suggest potential targets for prevention and treatment efforts aimed at reducing disordered eating in young females.

Practitioner points

- Our results indicate that young women with chronically unfulfilled basic psychological needs might be vulnerable to developing disordered eating behaviours.
- The observed patterns suggest that persistent experience of need frustration may engender an internal sense of ineffectiveness and lack of control, which then compels individuals to engage in disordered eating behaviours in an attempt to regain autonomy and competence.
- Interventions for eating disorders may be most effective when emphasizing the promotion of people's needs for autonomy and competence.

Limitations

- The model was constructed using cross-sectional data. Future experimental and longitudinal studies are needed to confirm the temporal sequence from basic psychological needs to issues of control.

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- The sample only consisted of young women. Further research should explore how thwarting of psychological need satisfaction functions in men.
- Our clinical sample was small and diagnosis was not confirmed through clinical interview; therefore, those data should be interpreted with caution.

Disordered eating is a phenomenon that is common in young women. Research suggests that up to 50% of the population regularly practices unhealthy weight control behaviours, including skipping meals, using food substitutes (powder or a special drink), and smoking more cigarettes (Kenardy, Brown, & Vogt, 2001; Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011; Wharton, Adams, & Hampl, 2008). Furthermore, up to 20% of the population report more extreme weight control efforts, such as self-induced vomiting, fasting, and using diet pills, laxatives, and diuretics (e.g., Neumark-Sztainer *et al.*, 2011; Wharton *et al.*, 2008). Clinical eating disorders (EDs) are estimated to affect approximately 7% of the total population (Smink, Van Hoeken, & Hoek, 2012), but even when full diagnostic criteria are not met, disordered eating is associated with high levels of psychopathology and considerable psychosocial impairment, including depressive symptoms, lowered self-esteem, body dissatisfaction, substance abuse, suicidal behaviours, and impaired functioning (Crow, Stewart Agras, Halmi, Mitchell, & Kraemer, 2002; Mond *et al.*, 2006; Thomas, Vartanian, & Brownell, 2009). Furthermore, such non-clinical disordered eating is particularly concerning because it is the most common indicator of the development of a clinical ED (Heatherton & Polivy, 1992; Polivy & Herman, 1985; Stice, 2001). Given the range and severity of problems associated with disordered eating, it is important to identify factors that might place individuals at a greater risk for adopting disordered eating habits.

One framework that has recently gained popularity in describing the mechanisms behind adaptive and disordered forms of eating is self-determination theory (SDT; Deci & Ryan, 1985, 2000). Central to SDT is the tenet that people have a set of basic psychological needs that are necessary for effective functioning, psychological health, growth, and integrity (Deci & Ryan, 2000). In particular, this theory outlines three universally important needs: autonomy, competence, and relatedness. The need for autonomy reflects the need to experience a sense of volition and choice in one's activities. The need for competence involves the need to feel efficacious and capable of achieving desired outcomes. Finally, the need for relatedness refers to the need to feel cared for and connected to others (Ryan & Deci, 2002). Need satisfaction has been associated with psychological well-being, productivity, and social functioning (e.g., Vansteenkiste, Niemiec, & Soenens, 2010; for an overview). Conversely, need frustration has been found to predict diminished self-motivation and greater ill-being; in fact, need thwarting is implicated in the aetiology of many forms of psychopathology (Ryan, Deci, Grolnick, & La Guardia, 2006).

According to SDT, when basic psychological needs are thwarted, people develop defences and self-protective accommodations to cope with the associated psychological deficit (e.g., controlling regulatory styles, compensatory motives or need substitutes, and rigid behaviour patterns; Ryan, Sheldon, Kasser, & Deci, 1996). Although these strategies fail to satisfy the thwarted basic needs, they provide some collateral satisfaction. Disordered eating behaviours can be thought of as an instance of rigid behaviour patterns that may serve to satisfy a frustrated need (Deci & Ryan, 2000). Specifically, fixation on extremely stringent eating routines and rules provides people with a sense of structure, predictability, and security in their lives and is thought to represent, in part, substitute satisfaction prompted by deficits in perceived competence and autonomy. In the absence

of genuine need satisfaction, controlling food and weight becomes a means through which individuals can regain some control over their own behaviours and outcomes and thus derive a sense of competence and autonomy (Deci & Ryan, 2000). Furthermore, frustrated relatedness needs may lead to attempts to change one's body as a means of gaining social approval (Thogersen-Ntoumani, Ntoumanis, & Nikitaras, 2010).

A number of empirical studies have indirectly demonstrated an association between unfulfilled psychological needs for autonomy and competence and eating pathology. For example, lower levels of perceived autonomy in one's family are associated with ED symptoms in female adolescents (Karwautz *et al.*, 2003). Other studies have shown that, in young women, perceived autonomy protects against sociocultural pressures about body image (Pelletier & Dion, 2007) and is negatively associated with eating disordered attitudes and behaviours (Frederick & Grow, 1996; Pelletier, Dion, & Lévesque, 2004). Further, women diagnosed with anorexia nervosa have been found to experience a greater sense of impersonal causality, which is indicative of general feelings of incompetence and lack of agency (Strauss & Ryan, 1987). Finally, one study with adolescent girls found that frustrated psychological needs (a combination of competence, autonomy, and relatedness) predicted body dissatisfaction, which in turn predicted unhealthy weight control behaviours (Thogersen-Ntoumani *et al.*, 2010).

Although there is accumulating evidence that frustrated psychological needs for autonomy and competence are associated with disordered eating behaviours, less is known about the mechanism underlying this association. One possible mechanism at play in this relationship is perceived lack of control (cf. Deci & Ryan, 2000). That is, thwarted needs for autonomy and competence may lead individuals to perceive life and themselves as out of control which, in turn, may increase vulnerability to developing disordered eating behaviours in an attempt to reassert a sense of control. Indeed, issues of control are widely thought to play a role in the development and maintenance of disordered eating behaviours. First proposed by Bruch (1973), obsessive control over food and weight is viewed by many theorists as a functional response to acute feelings of lack of control (e.g., Crisp, 1995; Slade, 1982). The individual experiences herself or himself and life to be chaotic and out of control (Patching & Lawler, 2009) and, in the absence of adaptive personal control strategies, attempts to regain a sense of control and effectiveness through dietary self-control (Fairburn, Shafran, & Cooper, 1999).

In support of this hypothesis, results of several studies indicate that ED patients experience greater loss of control and feelings of helplessness (Lee, Chan, Kwok, & Hsu, 2005), are more likely to perceive themselves as controlled by others (Tiggemann & Raven, 1998; Williams, Chamove, & Millar, 1990), report a higher fear of losing control over themselves (Tiggemann & Raven, 1998), and endorse greater feelings of ineffectiveness (Wade, Wilksch, Paxton, Byrne, & Austin, 2015) compared to healthy controls. Studies using qualitative methods paint a similar picture: ED patients commonly describe their disorder as providing a sense of control, will power, or structure to their lives (e.g., Espindola & Blay, 2009; Patching & Lawler, 2009; Serpell, Treasure, Teasdale, & Sullivan, 1999). Recent study by Froreich, Vartanian, Grisham, and Touyz (2016) indicates that the link between control and disordered eating also exists in non-clinical community samples, suggesting that dysfunctional control beliefs are dimensional rather than categorical in nature. Although there is strong evidence for a link between issues of control and disordered eating, no studies have examined whether issues of control can account for the link between frustrated psychological needs and disordered eating.

The present study

This cross-sectional study used path analysis to examine whether issues of control can account for the association between needs for autonomy and competence and eating pathology. Note that we did not include relatedness in our analysis because relatedness needs are thought to be associated with a desire to gain social approval rather than with a sense of control. Indeed, there was no consistent association between relatedness needs and control in our samples. Although control can be operationalised in a number of ways, two constructs that seem most directly related to eating pathology are ineffectiveness and fear of losing self-control (FLC; Froreich *et al.*, 2016). Eating pathology was assessed using a global measure of ED symptoms, as well as a scale that assesses rituals and preoccupations specific to EDs. We hypothesized that women who report lower need satisfaction in their lives would also report experiencing greater feelings of ineffectiveness and fears around losing control over themselves, and that these issues of control would explain the association between frustrated needs and disordered eating behaviours. Support for this hypothesis would provide some insight into potential precursors to issues of control in disordered eating and suggest potential targets for intervention efforts.

Methods

To increase the generalizability of our results, three separate samples were included in the study: The first consisted of a sample of female undergraduate students, the second consisted of a sample of female community members, and the third consisted of a sample of individuals who self-identified as having been diagnosed with an ED. In all samples, participants were excluded if they provided incomplete data (Sample 1 $n = 8$; Sample 2 $n = 16$) or if they failed any of the validity checks[1] included in the surveys (Sample 1, $n = 24$; Sample 2, $n = 65$; Sample 3, $n = 2$). The data reported below are based on the final sample of valid participants' data.

Participants

Undergraduate sample (Sample 1)

Participants from the undergraduate sample were 323 female students from a first-year psychology course at a large Australian university. Participants received course credit for taking part in this study. Their mean age was 19.61 years ($SD = 3.27$), and their mean body mass index (BMI [kg/m^2], based on self-reported height and weight) was 21.99 ($SD = 3.61$). The majority of the sample was White ($n = 146$; 45.2%) or Asian ($n = 146$; 45.2%).

Community sample (Sample 2)

Participants from the community sample were 371 women who were recruited through the Amazon Mechanical Turk (MTurk) website. Individuals who are registered with MTurk have access to a range of tasks that they can complete for small monetary incentives. They then select, of their own volition, which tasks they wish to complete. Participants were paid \$2 for taking part in this study. Their mean age was 29.75 years

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[1] *Validity checks were questions directing participants to select a particular response option.*

(SD = 5.79), and their mean BMI was 23.46 (SD = 7.45). The majority of the sample was White (n = 287; 77.4%). All participants were based in the USA.

ED sample (Sample 3)

Participants from the ED sample were 41 women who self-reported having been diagnosed with an ED. They were either referred through their treating clinician or responded to an advertisement posted on Facebook. Their mean age was 23.88 (SD = 7.95), and their mean BMI was 20.85 (SD = 4.62). The majority of the sample was White (n = 28; 68.3%).

Measures and procedure

All of the measures and procedures were identical across samples, and this research was approved by the university's ethics committee. Participants signed up for an online study on 'personality and control'. After reading an introductory information page and indicating their consent, participants completed a series of questionnaires that were presented in random order (except for the measures of ED psychopathology, which were always presented at the end). These measures included:

Basic psychological need satisfaction

The Basic Need Satisfaction in Life Scale (Gagne, 2003) was used to assess satisfaction of the needs for autonomy (e.g., 'I feel like I can decide for myself how to live my life'; seven items), competence (e.g., 'I often do not feel very capable'; eight items), and relatedness (e.g., 'I really like the people I interact with'; six items). Items were rated on a 7-point scale ranging from 1 (Not true at all) to 7 (Definitely true), with some items reverse coded such that higher scores indicating greater need satisfaction. Although all three needs were assessed, this study focused only on competence and autonomy. The Basic Need Satisfaction in Life Scale has been shown to have good predictive validity (e.g., Deci *et al.*, 2001; Gagne, 2003) and each of the subscales has demonstrated satisfactory levels of internal reliability in previous research (e.g., Gagne, 2003; Schüler & Kuster, 2011). For the current study, Cronbach's alpha and coefficient omega[2] were acceptable for both autonomy (Sample 1 α = .75, ω = .75, 95% CI [.69–.79]; Sample 2 α = .86, ω = .86, 95% CI [.83–.88]; Sample 3 α = .73, ω = .74, 95% CI [.55–.85]) and competence (Sample 1 α = .78, ω = .79, 95% CI [.75–.82]; Sample 2 α = .85, ω = .86, 95% CI [.83–.88]; Sample 3 α = .74, ω = .73, 95% CI [.55–.82]).

Issues of control

Two measures of control were included in this study: Ineffectiveness was assessed with the 10-item ineffectiveness subscale of the Eating Disorder Inventory-2 (EDI-2-I; Garner, 1991). This subscale assesses feelings of general inadequacy, insecurity, worthlessness, and lack of control over one's life. Participants rate each item on a 6-point scale (1 = Never, 6 = Always), with higher mean scores indicating a greater sense of

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[2] *Because Cronbach's alpha can provide a biased estimate, we also report omega estimates. Omega tends to outperform alpha and makes fewer assumptions about the data (Dunn, Baguley, & Brunsden, 2014). Omegas are interpreted in a similar fashion to alphas.*

ineffectiveness. High internal reliability estimates for the ineffectiveness subscale have been demonstrated in both clinical and non-clinical samples (e.g., Eberenz & Gleaves, 1994). Consistent with previous research, Cronbach's alpha and omega in this study were excellent (Sample 1 α = .91, ω = .91, 95% CI [.90–.93]; Sample 2 α = .95, ω = .95, 95% CI [.94–.96]; Sample 3 α = .91, ω = .92, 95% CI [.86–.95]).

Fear of losing self-control was measured using an adapted version of the Self-Control subscale of Reid and Ware's (1974) Internal–External questionnaire. Tiggemann and Raven (1998) adapted the original 8-item scale to express FLC by adding 'I fear', 'I am afraid', or 'I worry' to the beginning of each item. A sample item of the original scale is, 'Sometimes I impulsively do things, which at other times I definitely would not let myself do', and this item was changed to, 'I worry that I sometimes will impulsively do things, which at other times I definitely would not let myself do'. Each item was rated on a 7-point scale that ranged from 1 (Doesn't apply to me at all) to 7 (Always applies to me), with higher scores indicating greater doubts about being able to control one's own impulses, desires, and emotional behaviour. This scale has been shown to be reliable in prior work (Froreich *et al.*, 2016; Tiggemann & Raven, 1998) and internal consistency was excellent in this study (Sample 1 α = .92, ω = .92, 95% CI [.90–.93]; Sample 2 α = .94, ω = .95, 95% CI [.93–.95]; Sample 3 α = .92, ω = .92, 95% CI [.88–.95]).

Eating pathology

Participants also completed two measures of ED psychopathology: The 22-item Eating Disorder Diagnostic Scale (EDDS; Stice, Telch, & Rizvi, 2000) assesses the diagnostic criteria for anorexia nervosa, bulimia nervosa, and binge ED, as described in 4th edition of the *Diagnostic and Statistical Manual for Mental Disorders* (4th ed.; *DSM–IV*; American Psychiatric Association, 1994). Sample items include 'Has your weight influenced how you think about (judge) yourself as a person?'; 'During the past 6 months have there been times when you felt you have eaten what other people would regard as an unusually large amount of food (e.g., a quart of ice cream) given the circumstances?'; 'How many times per week on average over the past 3 months have you made yourself vomit to prevent weight gain or counteract the effects of eating?'. The EDDS returns subthreshold and threshold diagnoses for all three DSM-IV eating disorders and a continuous ED symptom composite score (SCS), which indicates participants' overall level of eating pathology. The SCS is computed by standardizing and summing scores across all items (expect for items asking for weight, height, and birth control pill use). Because this study included two non-clinical samples in which the prevalence of clinical EDs was expected to be low, the SCS was used to index eating pathology as a continuous measure. The SCS has been shown to have adequate internal consistency, test–retest reliability, convergent validity, and predictive validity (e.g., Stice, Fisher, & Martinez, 2004). Cronbach's alpha and omega in this study were good across all three samples (Sample 1 α = .87, ω = .88, 95% CI [.85–.90]; Sample 2 α = .87, ω = .83, 95% CI [.79–.86]; Sample 3 α = .76[3]).

The Yale–Brown–Cornell Eating Disorders Scale Self-Report Questionnaire (YBC-EDS-SRQ; Bellace *et al.*, 2012) consists of a 65-item symptom checklist that enumerates a wide range of eating-related preoccupations and rituals frequently experienced by ED patients, followed by 19 questions that evaluate the severity of rituals and preoccupations experienced by the individual by rating the time occupied by symptoms, distress caused

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[3] *For this sample, R did not return an omega value.*

by the symptoms, degree of control over symptoms, and overall impairment of functioning due to these symptoms. Of the 19 items, the core YBC-EDS-SRQ scale consists of eight items, four addressing preoccupations and four investigating rituals. The total score ranges from 0 to 32, with higher scores indicating more time occupied by symptoms, greater distress caused by symptoms, less perceived control over symptoms, and greater overall impairment of functioning due to these symptoms. This measure has demonstrated evidence of internal consistency and construct validity (Bellace *et al.*, 2012). For the current study, Cronbach's alpha and omega for the total score were excellent (Sample 1 α = .91, ω = .90, 95% CI [.88–.92]; Sample 2 α = .90, ω = .90, 95% CI [.89–.92]; Sample 3 α = .92, ω = .92, 95% CI [.86–.95]).

Demographics
Finally, participants reported their age, ethnicity, height, and weight. BMI was calculated as kg/m^2.

Statistical analyses
All analyses were conducted independently for each sample. Means and standard deviations for all variables in this study are shown in Table 1. Given the relatively small sample size of the ED group, we expected that some of the analyses would be underpowered, which would result in non-significant paths. Therefore, results in this sample will be treated as largely exploratory.

Correlational analyses were conducted to examine the bivariate associations among all of the study variables. We then specified a two-stage path model in which unsatisfied needs for autonomy and competence predicted control issues, and control issues predicted disordered eating and eating-related rituals and preoccupations. It is important to note that the terminology of 'predict' is used in a statistical sense to indicate that a unidirectional relationship is being proposed between two variables; it is not intended to

Table 1. Means (*SD*) for samples 1, 2, and 3 for demographic characteristics and variables included in the path model

	Sample 1	Sample 2	Sample 3	F (p-value)
1. Autonomy	4.84[a] (0.90)	5.01[b] (1.12)	4.50[c] (1.03)	5.73 (.003)
2. Competence	4.69[a] (1.03)	4.99[b] (1.25)	4.40[a,c] (1.09)	8.89 (<.001)
3. EDI-I	2.84[a] (0.91)	2.60[b] (1.09)	3.77[c] (1.04)	26.10 (<.001)
4. FLC	3.29[a] (1.36)	3.03[b] (1.48)	3.92[c] (1.54)	8.53 (<.001)
5. SCS	21.07[a] (13.96)	20.72[a] (14.82)	40.49[b] (16.38)	35.23 (<.001)
6. YBC-EDS-SRQ	6.82[a] (5.30)	7.15[a] (5.45)	16.95[b] (6.25)	65.37 (<.001)
7. BMI	21.99[a] (3.61)	23.46[b] (7.45)	20.85[a] (4.62)	7.15 (.001)
8. Age	19.61[a] (3.27)	29.75[b] (5.79)	23.88[c] (7.95)	354.43 (<.001)

Note. EDI-I = eating disorder inventory-ineffectiveness; FLC = fear of losing self-control; SCS = symptom composite score; YBC-EDS-SRQ = Yale–Brown–Cornell Eating Disorders Scale Self-Report Questionnaire; BMI = body mass index.
Autonomy and Competence: two subscales from the Basic Psychological Needs Satisfaction Scale. Means within a row with different superscript letters are significantly different at $p \leq .05$.

suggest that one variable necessarily temporally preceded or caused the other, which is not possible to adequately test using only cross-sectional data.

To determine model fit, we used a range of indicators including the chi-square (χ^2) (non-significant values indicate an adequate model); comparative fit index (CFI; values above .95 indicate good fit); normed fit index (NFI; values above .95 indicate good fit); standardized root mean square residual (SRMR; values <.08 indicate good fit); and root mean square error of approximation (RMSEA; values ≤.05 with a confidence interval [CI] from .00 to .08 indicate good fit; see Hu & Bentler, 1999).

Next, we tested for indirect effects of need satisfaction on the disordered eating variables via ineffectiveness and FLC. To do so, we used bootstrap analysis based on 5,000 resamples to estimate bias-corrected standard errors and 95% bias-corrected confidence intervals for the indirect effects (Cheung & Lau, 2008). This procedure treats the data as a population, and takes the specified number of resamples and reruns the model for each one. This process creates a sampling distribution, produces standard errors, and creates confidences intervals, thus assessing the stability of parameter estimates. If zero is not included in the 95% CI for an indirect effect, then the indirect effect is significant at $p < .05$.

Finally, we conducted multiple-group analysis to determine whether relationships are similar across samples. To do so, we first explored the hypothesized models for each sample separately and then tested the model across the three samples simultaneously. The equality of the models was evaluated by comparing the unconstrained model (in which all paths were free to vary) to a constrained model in which unstandardized regression weights, factor covariance, and residual variance estimates were constrained to be equal across the models. A non-significant chi-square difference indicates that the model fits equally well for all groups (Klein, 2005). All models were tested using AMOS (Version 21.0, SPSS Inc., Chicago, IL, USA).

Results

Correlation analyses

The bivariate correlations among all of the variables in this study are shown in Table 2. Across all three samples, satisfaction of the needs for autonomy and competence was negatively correlated with ineffectiveness, FLC, global eating disorder symptoms (SCS), and eating-related rituals and preoccupations (YBC-EDS-SRQ). Ineffectiveness and FLC were positively correlated with SCS scores and YBC-EDS-SRQ scores. Finally, SCS scores were positively correlated with YBC-EDS-SRQ scores. The pattern of correlations remained the same when controlling for age and for BMI.

Path analysis

Path analysis was used to test the hypothesis that ineffectiveness and FLC would mediate the relation between need satisfaction and eating pathology. In the light of the observed bivariate correlations in all three samples between autonomy and competence, between ineffectiveness and FLC, and between SCS and YBC-EDS-SRQ scores, these variables were allowed to co-vary in all models. Figure 1 shows the path models including standardized path coefficients, separately for each sample and when samples were combined.

The overall model fit was good for the student sample, $\chi^2(4) = 4.99$, $p = .29$, CFI = .999, NFI = .995, SRMR = .017, RMSEA = .028, RMSEA 90% CI = .000–.092; for

Table 2. Bivariate correlations, means, and standard deviations for all variables included in the analyses, presented for each sample separately

		1	2	3	4	5	6	7	8
Sample 1	1. Autonomy	—							
	2. Competence	.66***	—						
	3. EDI-I	−.64***	−.74***	—					
	4. FLC	−.45***	−.41***	.51***	—				
	5. SCS	−.27***	−.22***	.37***	.46***	—			
	6. YBC-EDS-SRQ	−.30***	−.28***	.42***	.41***	.75***	—		
	7. BMI	−.06	.02	.15**	.14*	.42***	.28***	—	
	8. Age	−.01	.03	.02	.04	.06	.03	.25***	—
Sample 2	1. Autonomy	—							
	2. Competence	.75***	—						
	3. EDI-I	−.76***	−.82***	—					
	4. FLC	−.58***	−.56***	.61***	—				
	5. SCS	−.33***	−.34***	.42***	.47***	—			
	6. YBC-EDS-SRQ	−.43***	−.41***	.49***	.51***	.71***	—		
	7. BMI	−.16**	−.19***	.21***	.26***	.40***	.27***	—	
	8. Age	.05	.06	−.06	−.11*	−.03	.02	.14**	—
Sample 3	1. Autonomy	—							
	2. Competence	.82***	—						
	3. EDI-I	−.81***	−.76***	—					
	4. FLC	−.41**	−.40*	.44**	—				
	5. SCS	−.33*	−.36*	.41**	.51**	—			
	6. YBC-EDS-SRQ	−.30*	−.42**	.49**	.47**	.67***	—		
	7. BMI	−.26	−.20	.23	.25	.39*	.02	—	
	8. Age	−.06	−.03	.13	.30	.27	.18	.09	—

Note. EDI-I = eating disorder inventory-ineffectiveness; FLC = fear of losing self-control; SCS = symptom composite score; YBC-EDS-SRQ = Yale–Brown–Cornell Eating Disorders Scale Self-Report Questionnaire; BMI = body mass index.
Autonomy and Competence: two subscales from the Basic Psychological Needs Satisfaction Scale.
*p < .05; **p < .01; ***p < .001.

the community sample, $\chi^2(4) = 5.15$, $p = .27$, CFI = .999, NFI = .996, SRMR = .011, RMSEA = .028, RMSEA 90% CI = .000–.087; and for the ED sample, $\chi^2(4) = 4.04$, $p = .40$, CFI = 1.000, NFI = .972, SRMR = .026, RMSEA = .016, RMSEA 90% CI = .000–.240. Given that each of these three models fit well, a multiple-groups structural equation model was then tested in which all pathways, covariances, and residuals were constrained to be equivalent across the student, community, and ED samples (i.e., a fully constrained model). The fully constrained multiple-groups *SEM* fit the data well, $\chi^2(12) = 14.25$, $p = .29$, CFI = .994, NFI = .976, SRMR = .056, RMSEA = .020, RMSEA 90% CI = .000–.034, indicating equivalence across groups. Furthermore, chi-square difference tests suggested the fully constrained model was as strong of a fit as the unconstrained model: $\chi^2_{\text{diff}}(34) = 45.55$, $p = .09$.

Results showed that, for both students and community participants, there were significant direct paths from autonomy and competence to ineffectiveness and FLC. Furthermore, ineffectiveness and FLC significantly predicted SCS and YBC-EDS-SRQ scores, even when controlling for all other variables in the model. In both samples, there were significant indirect paths from autonomy/competence to SCS/YBC-EDS-SRQ scores through ineffectiveness and FLC (see Table 3). For the ED sample, all of the paths were in
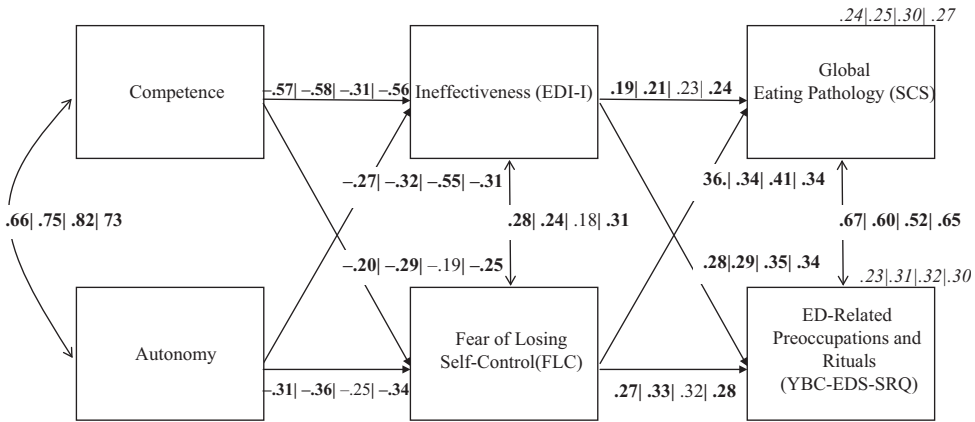
Figure 1. Path diagrams depicting the final model, presented for each sample separately and when samples were combined. For each set of coefficients, the first value represents Sample 1, the second value represents Sample 2, the third value represent Sample 3, and the fourth value represents the combined samples. Values presented are standardized path coefficients. Values in bold are statistically significant at an alpha of .05. The values in italics are explained variance. *Note.* Autonomy and Competence: two subscales from the Basic Psychological Needs Satisfaction Scale.

Table 3. Summary of standardized indirect effects for each sample

	Sample 1				Sample 2				Sample 3			
	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*
	Autonomy		Competence		Autonomy		Competence		Autonomy		Competence	
SCS	−.17	<.001	−.18	<.001	−.19	<.001	−.22	<.001	−.23	.06	−.15	.12
YBC-EDS-SRQ	−.16	<.001	−.21	<.001	−.21	<.001	−.26	<.001	−.27	.02	−.17	.12

Note. SCS = symptom composite score; YBC-EDS-SRQ = Yale–Brown–Cornell Eating Disorders Scale Self-Report Questionnaire.
Autonomy and Competence: two subscales from the Basic Psychological Needs Satisfaction Scale.

the predicted direction but some did not reach statistical significance, most likely due to the small sample size. There were significant direct paths from both autonomy and competence to ineffectiveness, and there was also a significant direct path from ineffectiveness to YBC-EDS-SRQ scores. The direct paths from autonomy/competence to FLC were not statistically significant. There was, however, a significant direct path from FLC to SCS scores. The indirect paths from autonomy to YBC-EDS-SRQ scores through control issues were also significant.

Discussion

Unsatisfied basic psychological needs have been associated with a range of negative psychological and physical health outcomes, including disordered eating behaviours. This study examined the nature of the connections among unsatisfied needs for autonomy and

competence, issues of control, and disordered eating behaviours in three different samples of young women: an undergraduate sample, a community sample, and a group who self-identified as being diagnosed with an ED. In both the student and community samples, lack of need satisfaction was associated with greater issues of control (heightened sense of ineffectiveness and fears of losing self-control), and issues of control were associated with ED pathology. Importantly, issues of control were found to mediate the association between need satisfaction and ED pathology. For the ED sample, although some of the paths were not significant, again most likely due to a small sample size, the overall pattern of results was the same. Indeed, the multiple-groups analysis indicated that the model fit the data of all three samples equally well, which speaks to the robustness and generalizability of our findings.

The present results suggest that issues of control might be one of the mechanisms through which lack of psychological need satisfaction is associated with disordered eating. Although these relationships would need to be tested with experimental and longitudinal data, it is possible that persistent experience of need frustration may engender an internal sense of ineffectiveness and lack of control, which then compels individuals to engage in disordered eating behaviours in an attempt to regain autonomy and competence. In the context of perceived failure in all other aspects of one's life (Slade, 1982), disordered eating behaviours may be positively reinforced by the feelings of success, achievement, and control that result from successful dietary restriction.

The sense of satisfaction provided by unhealthy weight control behaviours is often short-lived (Crocker, 2002). Reports from patients who are recovered or in recovery has shown that, although individuals may initially perceive themselves as more 'in control' of their life situation, the dynamic soon changes as life becomes increasingly self-limiting and determined by self-imposed, rigid rules around food consumption and exercise regimes (Patching & Lawler, 2009; Weaver, Wuest, & Ciliska, 2005). As a consequence, symptoms come to be experienced as incontrollable, leading people to feel even less in control of their lives than they did before they engaged in disordered eating behaviours. Furthermore, over the longer run, disordered eating behaviours is likely to interfere with genuine need satisfaction in that the focus on body control diverts attention away from the deeper causes of the need thwarting (Deci & Ryan, 2000; Ryan *et al.*, 2006), thus creating a self-perpetuating cycle.

The present study replicated previous findings showing that ineffectiveness and FLC predict disordered eating behaviours (e.g., Froreich *et al.*, 2016; Tiggemann & Raven, 1998; Wade *et al.*, 2015). Importantly, we also showed a direct link between basic psychological needs and perceived control. Although the results need to be replicated in experimental studies, the present findings suggest that efforts to facilitate need satisfaction can help reduce the risk of psychological issues related to control as well as eating pathology. This avenue might be particularly promising given that need satisfaction fluctuates from day to day within individuals depending on whether the days' activities hindered or promoted need satisfaction (Sheldon, Ryan, & Reis, 1996). Psychological need frustration therefore represents a potentially malleable target for interventions. Future study should explore whether momentary fluctuations in need frustration predict concurrent fluctuations in perceived control and/or eating disordered behaviours.

Another direction for future research would be to expand the model we tested to include personality traits that could increase vulnerability to need frustration and its negative consequences. Two potentially relevant personality traits in this context are low self-directedness and perfectionism, both of which have been associated with eating

pathology (e.g., Bulik, Sullivan, Fear, & Pickering, 2000; Fassino *et al.*, 2002; Wade *et al.*, 2015). Individuals low in self-directedness have difficulties setting and pursuing personally meaningful goals and may instead feel pressured to adopt societally promoted (but not personally endorsed) values which are likely to elicit need frustrating experiences (Deci & Ryan, 2000). Similarly, high levels of self-critical perfectionism may create need frustrating experiences through the setting of rigid and overly high standards. Not only do perfectionists set themselves up for failure (i.e., competence frustration), they also act out of 'mustivation', which ultimately frustrates autonomy (Vansteenkiste, 2013). Self-critical perfectionism has indeed been found to relate to increases in psychological need frustration which, in turn, predicted increases in binge eating symptoms (Boone, Vansteenkiste, Soenens, Van der Kaap-Deeder, & Verstuyf, 2014).

The results of the present study provide novel insights about the connection between frustrated needs and eating pathology; however, the study also has limitations. First, the cross-sectional nature of the study does not allow us to make causal inferences about the associations among the variables. For some of the variables, associations have been determined by previous longitudinal studies (e.g., lack of need satisfaction prospectively predicts disordered eating behaviours; Boone *et al.*, 2014). However, the temporal sequence from basic psychological needs to issues of control still awaits confirmation. Second, the sample consisted of only young women. The rates of disordered eating behaviours in males have increased significantly over the past years (Hay, Mond, Buttner, & Darby, 2008) and further research should explore how thwarting of psychological need satisfaction functions in men. Additionally, our clinical sample was small and diagnosis was not confirmed through clinical interview; therefore, those data should be interpreted with caution. However, given the parallels between the three samples included in this study, we expect that similar results would emerge from a true clinical sample. Finally, it should be noted that the correlations between autonomy and competence appear to be approaching multicollinearity. Future research should investigate whether these are actually two separate constructs.

In conclusion, unfulfilled needs for autonomy and competence are associated with feelings of ineffectiveness and fears of losing control and, in turn, to disordered eating behaviours. Although our model was constructed using cross-sectional data, these findings suggest potential targets for prevention and treatment efforts aimed at reducing disordered eating in young females. Specifically, interventions may be most effective when emphasizing the promotion of people's needs for autonomy and competence (Thaler *et al.*, 2016). Clinicians may want to explore the deeper causes of their clients' need deprivation, help them develop healthier ways to cope with these experiences, and support them in identifying and actively pursuing activities that satisfy their basic psychological needs. Similarly, boosting need satisfaction during critical developmental periods early in life might buffer against the development of disordered eating behaviours.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

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