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Satisfaction with normative life domains and the course of anorexia nervosa

Sanne F. W. van Doornik MSc^{1,2}  | Brian D. Ostafin PhD¹  | Nienke C. Jonker PhD¹  |
Klaske A. Glashouwer PhD^{1,2}  | Peter J. de Jong PhD¹ 

¹Department of Clinical Psychology and Experimental Psychopathology, University of Groningen, Groningen, The Netherlands

²Department of Eating Disorders, Accare Child and Adolescent Psychiatry, Groningen, The Netherlands

Correspondence

S.F.W. van Doornik, MSc, Grote Kruisstraat 2/1, 9712 TS Groningen, The Netherlands.
Email: s.f.w.van.doornik@rug.nl

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Abstract

Objective: Satisfaction with normative life domains has been proposed as an important factor in the persistence of anorexia nervosa (AN). Initial evidence from a cross-sectional study indicated that individuals with AN reported lower satisfaction with normative life domains than individuals without an eating disorder. As an important next step in understanding causal relations, the present study used a longitudinal design to examine whether an improvement in AN symptoms is paralleled by an increase in satisfaction with normative life domains from baseline to follow-up and whether relatively low satisfaction with normative life domains at baseline is related to less improvement in AN symptoms.

Methods: During baseline and at 1-year follow-up, adolescents with AN ($N = 69$) completed the Brief Multidimensional Students' Life Satisfaction Scale to measure satisfaction with normative life domains (e.g., friendships, school experience). Furthermore, eating disorder symptoms and BMI were measured.

Results: Improvement in eating disorder symptoms, but not in BMI, was paralleled by an increase in satisfaction with normative life domains. Relatively low satisfaction with normative life domains at baseline was not prospectively related to less improvement in eating disorder symptoms or BMI at follow-up.

Discussion: Our findings provide initial evidence that satisfaction with normative life domains is a malleable factor which fluctuates with symptom severity in AN. The results of this exploratory study point to the relevance of examining whether targeting satisfactory engagement with specific life domains optimizes treatment effectiveness.

Public Significance: We explored whether an improvement in anorexia nervosa symptoms from start of treatment to 1-year follow-up would be paralleled by an increase in satisfaction with normative life domains. Improvement in eating disorder symptoms (but not BMI) was indeed related to a concurrent increase in satisfaction with normative life domains. These preliminary results point to the promising possibility that targeting satisfactory engagement with specific life domains may potentially enhance treatment effectiveness.

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KEYWORDS

Anorexia nervosa, atypical anorexia nervosa, eating disorders, satisfaction, life satisfaction, meaning in life, normative life domains, adolescents, longitudinal

1 | SATISFACTION WITH NORMATIVE LIFE DOMAINS AND THE COURSE OF ANOREXIA NERVOSA

Anorexia nervosa (AN) is a severe eating disorder marked by emotional distress, psychosocial impairment, and physical morbidity (Schmidt et al., 2016). As current treatment options are limited in their effectiveness (Berends, Boonstra, & van Elburg, 2018; Murray, Quintana, Loeb, Griffiths, & Le Grange, 2019), learning more about the factors that are associated with treatment outcome of AN may facilitate intervention development. Meaning in life represents one such potential factor (Marco, Cañabate, Pérez, & Llorca, 2017). Pursuing valued goals, along with the feeling that one matters in the world and that life makes sense, plays a key role in whether individuals experience their lives as meaningful (George & Park, 2016; Martela & Steger, 2016). In addition, theory and empirical findings suggest that engaging with one's goals in a satisfying way is crucial for experiencing a meaningful life (King, Hicks, Krull, & Del Gaiso, 2006; Wolf, 2010). Initial evidence from a cross-sectional study indicated that individuals with AN reported lower satisfaction with meaningful, normative life domains than individuals without AN (van Doornik, Ostafin, Jonker, Glashouwer, & de Jong, 2021). As an important next step, we investigated whether (low) satisfaction with normative life domains is related to the persistence of AN.

Cognitive behavioral theories of eating disorders (EDs) propose that most of the clinical features of AN stem from an excessive influence of body shape and weight on self-evaluation (Fairburn, Cooper, & Shafran, 2003). Whereas most individuals without an ED are guided by goals and values in various normative life domains (e.g., family, friendships, school), individuals with AN focus mainly on goals and values related to shape, weight, and eating behavior (Fairburn et al., 2003). This overvaluation might lead to a self-reinforcing loop in which a goal to lose weight increases the motivational salience of weight-loss cues (e.g., "fat" body parts), and, subsequently, these salient cues attract attention and are processed more deeply, in turn reactivating the goal to lose weight (Williamson, White, York-Crowe, & Stewart, 2004). The individual's behavioral repertoire may become so focused on activities related to shape and weight-related goals that they experience impaired engagement with common sources of life meaning (Mulkerrin, Bamford, & Serpell, 2016), such as personal development and interpersonal relationships (Schnell, 2011). Such a pattern could lead to the experience that life lacks meaning (Marco et al., 2017). Paradoxically, AN symptoms may serve as a dysfunctional attempt to deal with these negative states regarding life meaning by providing (dysfunctional) goals and life coherence (Fox & Leung, 2009), creating a vicious cycle that maintains the disorder (Marco, Cañabate, & Pérez, 2019).

Increasing satisfaction with normative life domains may well lead to reductions in AN symptoms. First, similar to the self-reinforcing loop that contributes to ED (Williamson et al., 2004), satisfactory engagement in non-AN-related goals could reduce attentional resources available to engage in AN-related goals. Second, motivational models of change (Miller & Rollnick, 2012) propose that the exploration of and engagement in non-AN-related goals and values promotes motivation to change (Mulkerrin et al., 2016; Vitousek, Watson, & Wilson, 1998). Third, satisfactory goal pursuit of non-AN-related goals potentially increases the experience of positive emotions and subjective well-being (Klug & Maier, 2015), which have been suggested to have an inhibitory function on symptoms of AN (Selby & Coniglio, 2020). And fourth, in line with motivational models of alcohol use (Cox, Klinger, & Fadardi, 2015; Palfai & Weafer, 2006), the positive incentive value of AN-related goals may be reduced as individuals experience more emotional satisfaction from other normative life incentives.

Although excessive engagement with shape and weight-related goals is central in AN theories (Fairburn et al., 2003), there has been relatively little work on the influence of engagement and satisfaction with normative, non-AN-related goals. Although research shows that individuals with AN report low satisfaction with life in general (Magallares, Jauregui-Lobera, Gamiz-Jimenez, & Santed, 2014), only two studies have investigated low satisfaction with normative life domains in AN. One study showed that in a nonclinical student sample, lower satisfaction with normative life domains was related to more dysfunctional eating behaviors (e.g., binge eating) and weight perceptions (e.g., worrying about weight; Matthews, Zullig, Ward, Horn, & Huebner, 2012). The other study examined this question in a clinical sample, and showed that adolescents with AN reported lower satisfaction with normative life domains (e.g., school) than individuals without an ED, although their ratings of the importance of these life domains did not differ from individuals without AN (van Doornik, Ostafin, Jonker, Glashouwer, & de Jong, 2021).

Thus, these two earlier studies provided initial evidence that individuals with AN show lower satisfaction (but not lower importance ratings) with normative life domains (Matthews et al., 2012; van Doornik, Ostafin, et al., 2021). However, as these studies used cross-sectional designs, inferences concerning the directionality of the relationships cannot be made. To determine whether low satisfaction with normative life domains might be an important factor in the refractoriness of AN, an important next step is to examine whether satisfaction with normative life domains fluctuates with AN symptoms (Kraemer et al., 1997). If an improvement in AN symptoms is related to an improvement in satisfaction with normative life domains, this would indicate the relevance of low satisfaction with life domains as a potential (malleable) risk factor

in the persistence of AN, and would also point to its potential relevance as a treatment target.

Therefore, the present study applied a longitudinal design with a clinical sample of adolescents with AN to test the hypothesis that improvement in AN symptoms is paralleled by an increase in satisfaction with normative life domains from baseline to 1-year follow-up. The sample in the current study is the same sample as in van Doornik, Glashouwer, Ostafin, & de Jong, 2021; van Doornik, Ostafin, Jonker, Glashouwer, & de Jong, 2021, this time with follow-up data. As a second hypothesis we also tested whether relatively low satisfaction with normative life domains at baseline is related to less improvement in AN symptoms from baseline to 1-year follow-up. That is, individuals with low satisfaction with normative life domains at the start of treatment may be more stuck in the previously described vicious cycle, which involves reduced attentional resources for engaging in normative life domains, thereby making it harder to recover. As a subsidiary aim, we examined whether low perceived importance of normative life domains may also be involved in the persistence of AN. Although perceived importance of normative life domains did not differentiate AN and non-AN groups in our previous cross-sectional study (van Doornik, Ostafin, et al., 2021), importance may be relevant from a longitudinal perspective. For example, it is possible that individuals with AN who consider normative life domains as relatively unimportant will invest less effort in these domains, thereby remaining engaged in the AN-related goals contributing to a negative spiral that perpetuates the disorder (e.g., for similar perspectives in addiction, see Lewis, 2018).

2 | METHODS

2.1 | Participants

Individuals with AN ($N = 69$, 67 female, $M_{\text{age}} = 15.55$, $SD = 1.70$) aged 12 to 22 years old were recruited through the Department of Eating Disorders of Accare, a facility for child and adolescent psychiatry in the Netherlands, between June 2015 and June 2017 (same sample as in van Doornik, Ostafin, et al., 2021). All participants met DSM-5 criteria for AN (Binge Purge subtype $n = 10$; Restrictive subtype $n = 39$) or atypical AN (Binge Purge subtype $n = 9$; Restrictive subtype $n = 11$; DSM-5 classifications were made by clinicians from Accare, based on the EDE interview), no additional inclusion or exclusion criteria were applied. Most individuals were outpatients (according to the global self-report data of 60 participants, 27 participants were admitted to the inpatient clinic or hospital at some point during the study) and presented with their first episode of AN ($n = 62$; second episode $n = 7$).

Of the initial 69 individuals assessed at baseline, 59 (86%) completed the full follow-up assessment after 1 year, and three more only completed the EDE interview (90%, $n = 62$, 60 female, typical AN $n = 46$, atypical AN $n = 16$, $M_{\text{age}} = 16.45$, $SD = 1.55$). Of these 62 participants, BMI was available for 61 participants (98.4%, typical AN $n = 46$, atypical AN $n = 15$). Participants dropped out for various reasons: three were not doing well, three had just started an intensive

treatment program, and one did not provide a reason. Of the initial group assessed at baseline, 34 (49.3%) were still in treatment at follow-up, 27 were no longer in treatment (39.1%), and 8 (11.6%) did not provide this information.

2.2 | Materials

2.2.1 | Level of underweight

Level of underweight was operationalized using adjusted BMI ([actual BMI/50th percentile of BMI for age and gender] $\times 100$), in order to make BMI comparable for all individuals (Cole, Bellizzi, Flegal, & Dietz, 2000). The 50th percentile of BMI for gender and age was derived from the Netherlands Organization for Applied Scientific Research (TNO, 2010). Adjusted BMI scores between 85% and 120% were considered to be healthy weight, scores below 85% were considered to be underweight (Van Winckel & Van Mil, 2001).

2.2.2 | ED symptoms

ED symptoms were assessed in two ways. The Dutch child version of the Eating Disorder Examination (EDE) interview (Bryant-Waugh, Cooper, Taylor, & Lask, 1996) was used to assess ED symptoms during intake, on which DSM-5 classifications were based. During follow-up, the EDE was used again as a post-measure of ED pathology. On both occasions, an average score of the four subscales of the EDE (restraint, eating concern, weight concern, and shape concern) was calculated, providing a general index of ED symptom severity.

Additionally, a Dutch translation of the most recent version of the Eating Disorder Examination Questionnaire 6.0 (EDE-Q; Fairburn & Beglin, 2008) was used to provide a global measure of the severity of ED psychopathology. To be suitable for administration among adolescents, adaptations were made to the wording of some items, which were comparable to adaptations made for previous versions of the EDE-Q (Jansen, Mulken, Hamers, & Jansen, 2007). Participants indicate their answers on a scale between 0 (no days/not at all) and 6 (every day/markedly). An average score of the 22 items was used as a general index of ED pathology (cf. Aardoom, Dingemans, Op't, Landt, & van Furth, 2012), with higher scores indicating higher ED pathology. The internal consistency was excellent at baseline and follow-up ($\alpha = .93$ and $\alpha = .97$, respectively).

2.2.3 | Satisfaction with and importance of normative life domains

To assess satisfaction with normative life domains, participants completed the Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS) from the Peabody Treatment Progress Battery (Bickman et al., 2007), a revision of the original BMSLSS measure (Seligson,

Huebner, & Valois, 2003), in which the 7-point Terrible-Delighted scale is replaced by a 5-point Likert-type scale ranging from 1 (very unsatisfied) to 5 (very satisfied). Participants indicate how satisfied they are right now with each individual life domain (i.e., family life, friendships, school experience, self, and where the participant lives). One additional item measures satisfaction with life in general. The responses on the six items were averaged, with higher scores indicating higher satisfaction with normative life domains (cf. Athay, Kelley, & Dew-Reeves, 2012). According to the BMSLSS manual (Bickman et al., 2010), total scores of greater than 4.5 are considered to be high, total scores lower than 3.3 are considered to be low, and total scores between 3.3 and 4.5 represent a moderate level of perceived life satisfaction. These norms were based on a psychometric study sample of 749 adolescents between the ages of 11 and 18, who were all receiving mental health services (Bickman et al., 2010). Although the BMSLSS has not specifically been used in individuals with EDs, it has demonstrated sound psychometric qualities in various samples (Bickman et al., 2010; Büssing et al., 2009; Seligson et al., 2003). The reliability of the total score as indexed by Cronbach's alpha was .72 at baseline and .62 at follow-up. More item descriptive statistics can be found in Table A of the Supporting Information.

Participants' importance ratings for each domain and life in general were obtained in a separate set of questions, using a scale from 1 (very unimportant) to 5 (very important; cf. Seligson et al., 2003). Again, responses on the six items were averaged, with higher scores indicating the life domains to be more important. The internal consistency for these items was .66 at baseline and .76 at follow-up.

2.3 | Procedure

This study was approved by the medical ethical committee of the University Medical Center in Groningen, the Netherlands (NL.51694042.14). Participants, and their parents when participants were younger than 18, signed informed consent and provided written consent for the use of the intake EDE data, and for participation in the baseline and follow-up measures. Baseline assessment took place as soon as possible after intake (median 53 days after intake). At Accare there is usually a 4-week waiting period between intake and start of treatment, therefore most participants completed baseline assessment up to 4 weeks after treatment had been initiated. Approximately 1-year after baseline assessment, the follow-up assessment took place (median 373 days after baseline). Individuals who declined to participate were asked for the reason and were given the option to only complete the EDE. Baseline and follow-up assessment followed roughly the same procedure, with participants completing the EDE, EDE-Q, and BMSLSS, and having their height and weight measured. Since the current study was part of a larger project other measurements were also collected, but these are unrelated to the aims of this study (see Jonker, Glashouwer, Hoekzema, Ostafin, & de Jong, 2020; Jonker, Glashouwer, Ostafin, & de Jong, 2020). As treatment for AN provided at Accare is tailored to each individual, participants ($n = 60$) reported to have followed

different therapy components, such as Cognitive Behavior Therapy-Enhanced (CBT-E; Fairburn, 2008; $n = 50$), diet management and exposure ($n = 46$), consults with a dietician ($n = 45$), intensive family treatment ($n = 35$), and psychomotor therapy ($n = 22$).

2.4 | Statistical analyses

2.4.1 | Drop-outs

Differences in baseline ED symptoms, BMI, satisfaction with and importance of normative life domains between individuals who dropped-out and individuals who participated in the follow-up assessment were examined by conducting independent sample t tests.

2.4.2 | Change between baseline and follow-up

To examine whether participants on average showed a decrease in ED symptoms (measured with the EDE and EDE-Q) and an increase in BMI between baseline and follow-up, three paired sample t tests were conducted. Furthermore, two paired sample t tests were performed to examine whether participants on average showed an increase in satisfaction with and importance of normative life domains between baseline and follow-up. Additionally, bivariate correlations were computed to examine relationships between changes in ED symptoms, BMI, satisfaction with normative life domains, and importance of normative life domains.

2.4.3 | Hypothesis testing

Three regression analyses were conducted, with change in EDE (Model 1), EDE-Q (Model 2), or BMI (Model 3), as dependent variable. In step 1, intake EDE score (Model 1), baseline EDE-Q score (Model 2), or baseline BMI (Model 3), was entered as control variable. To test whether relatively low satisfaction with normative life domains at baseline was related to less improvement in AN symptoms, baseline satisfaction with normative life domains was added as independent variable in step 2. To examine whether a reduction in AN symptoms was paralleled by an increase in satisfaction with normative life domains, change in satisfaction with normative life domains was added in step 3. All independent variables were centered before they were included in the models and assumptions were checked. Bonferroni-Holm corrections were applied to correct for increased familywise error rate (the smallest p -value was tested against an alpha of .0167, the following p -values were tested against an alpha of .025 and .05, respectively).

2.4.4 | Subsidiary analyses

Afterwards, similar linear regression analyses were conducted with importance of normative life domains replacing satisfaction with

TABLE 1 Change in eating disorder symptoms, BMI, satisfaction with and importance of normative life domains

	Baseline (N = 69)	Follow-up (N = 59)	Paired sample t test		
	Mean (SD)	Mean (SD)	t	p	Cohen's d
EDE	3.74 (1.10)	1.81 (1.51) ^a	9.49	<.001	1.41
EDE-Q	4.16 (1.11)	2.57 (1.58) ^b	8.09	<.001	1.10
BMI	84.72 (12.16)	95.23 (14.91) ^c	−7.50	<.001	0.88
Satisfaction	3.20 (0.70)	3.37 (0.68) ^d	−1.99	.052	0.25
Importance	3.99 (0.64)	4.01 (0.72) ^d	−0.11	.915	0.01

Note: EDE = mean score on the Eating Disorder Examination Interview (range 0–6), EDE-Q = mean score on the Eating Disorder Examination Questionnaire (range 0–6), BMI = adjusted Body Mass Index, Satisfaction = mean satisfaction score on the Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS; range 1–5), Importance = mean importance score on the BMSLSS (range 1–5). EDE was assessed at intake, all other measures were assessed at baseline.

^aEDE was available for 67 participants at baseline and 62 participants at follow-up.

^bEDE-Q was available for 60 participants at follow-up.

^cBMI was available for 61 participants at follow-up.

^dSatisfaction and importance were available for 59 participants at follow-up.

normative life domains. Again, all independent variables were centered and Bonferroni–Holm corrections were applied.

3 | RESULTS

3.1 | Drop-outs

Independent sample *t* tests showed no significant baseline difference on EDE ($t[11.90] = -1.37, p = .197, d = 0.41$), EDE-Q ($t[67] = -.93, p = .357, d = 0.31$), BMI ($t[67] = -1.47, p = .146, d = 0.44$), satisfaction with ($t[67] = -0.08, p = .937, d = 0.02$), or importance of normative life domains ($t[67] = 0.45, p = .653, d = 0.15$) between individuals who did and did not participate in the follow-up of the present study.

3.2 | Change between baseline and follow-up

Between intake and follow-up, individuals with AN showed a decrease in ED symptoms, as assessed with the EDE and EDE-Q, and an increase in BMI (Table 1). Although average satisfaction with normative life domains was low at baseline and moderate at follow-up (Bickman et al., 2010), this change was not statistically significant. Additionally, there was no significant difference regarding the perceived importance of normative life domains between baseline and follow-up.

Table 2 displays the bivariate correlations between change in ED symptoms, BMI, satisfaction with and importance of normative life domains. Increased satisfaction with normative life domains was associated with larger reductions in ED symptoms as reflected in both the EDE and EDE-Q. However, such a relationship was absent for BMI. Furthermore, an increase in satisfaction with normative life domains was related to an increase in importance of normative life domains.

Moreover, results of the regression analyses indicated that individuals with more intense ED symptoms on intake EDE and baseline

TABLE 2 Bivariate correlations between indices of change in AN symptoms, satisfaction with and importance of normative life domains

Variable	1	2	3	4	5
1. Change in EDE		.66**	.19	.33*	.09
2. Change in EDE-Q			−.08	.33*	.25
3. Change in BMI				.10	−.04
4. Change in satisfaction					.42**
5. Change in importance					

Note: Change in EDE = intake minus follow-up mean score on the Eating Disorder Examination Interview, EDE-Q = baseline minus follow-up mean score on the Eating Disorder Examination Questionnaire, BMI = follow-up minus baseline adjusted Body Mass Index, Satisfaction = follow-up minus baseline mean satisfaction score on the Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS), Importance = follow-up minus baseline mean importance score on the BMSLSS, Positive change in EDE, EDE-Q, BMI, satisfaction with and importance of normative life domains indicate improvement.

* $p \leq .05$.

** $p \leq .01$.

EDE-Q showed a larger improvement over 1 year (Table 3, models 1 and 2, step 1). In contrast, baseline BMI was not predictive of change in BMI over 1 year (model 3, step 1).

Finally, to examine whether increased satisfaction with normative life domains during treatment predicted outcome at follow-up, three more simple regression analyses were conducted. Results showed that increased satisfaction with normative life domains significantly predicted follow-up EDE and EDE-Q scores, but not BMI (see Supporting Information for details).

3.3 | Hypothesis testing

Regarding our first hypothesis, results showed that an improvement in ED symptoms, assessed both with the EDE and EDE-Q, was paralleled by an increase in satisfaction with normative life domains from

TABLE 3 Regression models to test hypotheses on satisfaction with normative life domains in complete sample

Model	n	Dependent	Step	Independent	β	t	R^2_{change}	F_{change}	p (F)	α
1	57	Change in EDE	1	Baseline EDE	0.39	3.12**	0.15	9.76	.003	
			2	Baseline EDE	0.39	3.03**	0.00	0.00	.975	.167
				Baseline satisfaction	0.00	0.03				
			3	Baseline EDE	0.42	3.51**	0.13	9.83	.003	.0167
				Baseline satisfaction	0.21	1.52				
				Change in satisfaction	0.41	3.14**				
2	59	Change in EDE-Q	1	Baseline EDE-Q	0.26	2.01*	0.07	4.03	.050	
			2	Baseline EDE-Q	0.26	1.9	0.00	0.00	.984	.05
				Baseline satisfaction	-0.00	-0.02				
			3	Baseline EDE-Q	0.29	2.27**	0.13	8.51	.005	.025
				Baseline satisfaction	0.19	1.33				
				Change in satisfaction	0.40	2.91**				
3	58	Change in BMI	1	Baseline BMI	-0.16	-1.25	0.03	1.56	.218	
			2	Baseline BMI	-0.16	-1.23	0.00	0.02	.900	.025
				Baseline satisfaction	0.02	0.13				
			3	Baseline BMI	-0.16	-1.20	0.02	0.85	.362	.05
				Baseline satisfaction	0.08	0.52				
				Change in satisfaction	0.14	0.92				

Note: Change in EDE = intake minus follow-up mean score on the Eating Disorder Examination Interview, EDE-Q = baseline minus follow-up mean score on the Eating Disorder Examination Questionnaire, BMI = follow-up minus baseline adjusted Body Mass Index, Change in Satisfaction = follow-up minus baseline mean satisfaction score on the Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS), Positive change in EDE, EDE-Q, BMI, and BMSLSS indicate improvement.

* $p \leq .05$.

** $p \leq .01$.

TABLE 4 Regression models to test hypotheses on importance of normative life domains in complete sample

Model	n	Dependent	Step	Independent	β	t	R^2_{change}	F_{change}	p (F)	α
1	57	Change in EDE	1	Baseline EDE	0.39	3.12**	0.15	9.76	.003	
			2	Baseline EDE	0.39	3.11**	0.00	0.11	.741	.05
				Baseline importance	-0.04	-0.33				
			3	Baseline EDE	0.44	3.43**	0.04	2.34	.132	.025
				Baseline importance	0.03	0.22				
				Change in importance	0.21	1.53				
2	59	Change in EDE-Q	1	Baseline EDE-Q	0.26	2.00*	0.07	4.03	.050	
			2	Baseline EDE-Q	0.24	1.81	0.01	0.74	.394	.025
				Baseline importance	0.11	0.86				
			3	Baseline EDE-Q	0.25	1.99	0.11	7.05	.010	.0167
				Baseline importance	0.23	1.73				
				Change in importance	0.35	2.66**				
3	58	Change in BMI	1	Baseline BMI	-0.16	-1.25	0.03	1.56	.218	
			2	Baseline BMI	-0.15	-1.12	0.02	1.20	.277	.0167
				Baseline importance	-0.15	-1.10				
			3	Baseline BMI	-0.14	-1.05	0.01	0.42	.521	.05
				Baseline importance	-0.18	-1.25				
				Change in importance	-0.09	-0.65				

Note: Change in EDE = intake minus follow-up mean score on the Eating Disorder Examination Interview, EDE-Q = baseline minus follow-up mean score on the Eating Disorder Examination Questionnaire, BMI = follow-up minus baseline adjusted Body Mass Index, Change in Importance = follow-up minus baseline mean importance score on the Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS), Positive change in EDE, EDE-Q, BMI, and BMSLSS indicate improvement.

* $p \leq .05$.

** $p \leq .01$.

TABLE 5 Partial correlations between indices of change in eating disorder symptoms and satisfaction with individual domains, while controlling for baseline eating disorder symptoms and satisfaction

Variable	Change in EDE	Change in EDE-Q
1. Change in family	.17	.13
2. Change in friendships	.40**	.35*
3. Change in school	.15	.07
4. Change in self	.44**	.39**
5. Change in living location	.12	.09
6. Change in life in general	.47**	.36*

Note: Change in EDE = intake minus follow-up mean score on the Eating Disorder Examination Interview, EDE-Q = baseline minus follow-up mean score on the Eating Disorder Examination Questionnaire, Change in satisfaction with individual domains = follow-up minus baseline mean score for each specific domain, Positive change in EDE, EDE-Q, and satisfaction with each individual domain indicate improvement.

* $p \leq .05$.

** $p \leq .01$.

baseline to follow-up (Table 3, models 1 and 2, step 3). However, an improvement in BMI was not paralleled by an increase in satisfaction with normative life domains from baseline to follow-up (model 3, step 3).

With respect to our second hypothesis, results showed that relatively low satisfaction with normative life domains at baseline was not related to less improvement in ED symptoms over time, neither as indexed by changes in EDE or EDE-Q (models 1 and 2, step 2). Similarly, relatively low satisfaction with normative life domains at baseline was not related to less improvement in BMI (model 3, step 2).

3.4 | Subsidiary analyses

Results of the three subsidiary regression analyses showed that change in ED symptoms assessed with the EDE and improvement in BMI, were both not paralleled by a change in importance of normative life domains from baseline to follow-up (Table 4, models 1 and 3, step 3). However, improvement in ED symptoms assessed with the EDE-Q was paralleled by an increase in importance of normative life domains from baseline to follow-up (model 2, step 3). Finally, baseline importance of normative life domains was not predictive of improvement in ED symptoms, assessed with the EDE, EDE-Q, or BMI (models 1, 2, and 3, step 2).

3.5 | Post hoc analyses

Since the regression analyses showed that an improvement in ED symptoms was paralleled by a general increase in satisfaction with normative life domains, we post hoc explored the specific domains for which increase in satisfaction was associated with improvement in ED symptoms. Partial correlations were computed between improvement

in ED symptoms and satisfaction for each individual life domain, while controlling for baseline ED symptoms and baseline satisfaction with all life domains. Results showed improvements in ED symptoms to be positively related to an increase in satisfaction with friendships, the self, and life in general (Table 5).

4 | DISCUSSION

The present study used a longitudinal design to explore whether satisfaction with normative life domains is related to the persistence of AN. In line with our first hypothesis, the findings indicate that an improvement in ED symptoms was paralleled by an increase in satisfaction with normative life domains. However, this relationship was absent for BMI. Furthermore, results regarding the second hypothesis showed that satisfaction with normative life domains at baseline was unrelated to improvement in ED symptoms or BMI.

The finding that improvement in ED symptoms is paralleled by an increase in satisfaction with normative life domains extends the results of a previous cross-sectional study, in which we found that adolescents with AN reported lower satisfaction with normative life domains than matched individuals without an ED (van Doornik, Ostafin, et al., 2021). Furthermore, the current results support previous findings that satisfaction with normative life domains fluctuates with symptom severity in other disorders such as depression and addiction (Athay et al., 2012; Büssing, Heusser, & Mundle, 2011). These results suggest that satisfaction with normative life domains might reflect a trans-diagnostic factor that is involved in the persistence of various mental disorders.

Even though our findings showed that satisfaction with life domains and ED symptoms were interrelated over the course of treatment, the correlational nature of our study precludes inferences on the direction of relationship between life satisfaction and AN symptomatology. Thus, it is possible that an increase in satisfaction with normative life domains caused a reduction in AN symptoms, but it is also possible that reduced AN symptoms caused improvements in satisfaction with normative life domains. Furthermore, the relationship could be bi-directional. The fact that at 1 year follow-up individuals with AN still report lower satisfaction with normative life domains ($M = 3.37$, $SD = 0.68$) than the noneating disorder individuals in van Doornik et al. (2021; $M = 3.83$, $SD = 0.88$, $d = 0.58$), adds to the relevance of examining satisfaction with normative life domains in greater detail. From the perspective of elucidating risk factors (Kraemer et al., 1997), a crucial next step would be to determine whether focusing on satisfaction with life domains during experimental manipulations could serve to improve AN symptoms (cf. van Doornik, Glashouwer, Ostafin, & de Jong, 2021). If so, satisfaction with normative life domains could be considered a causal risk factor and a relevant target for AN treatment.

In the current study, improvements in ED symptoms were positively related to an increase in satisfaction with the self, life in general, and friendships. These findings are consistent with the cross-sectional findings indicating that individuals with AN reported lower

satisfaction with the self, life in general, and their school experiences than individuals without AN (van Doornik, Ostafin, et al., 2021). As mentioned above, the causal relations could go both ways. Given that ED psychopathology is related to low self-esteem (Brockmeyer et al., 2013), an increase in self-esteem might have led to an improvement in satisfaction with the self. However, it could also be that increased satisfaction with the self-reduced body image distortions frequently seen in AN, which could lead to lower ED symptoms (Stice & Shaw, 2002). Regarding satisfaction with general life, it is possible that reduced ED symptoms broadened the narrowed goal pursuit seen in AN, thereby increasing the possibilities of engaging in common sources of life meaning (Mulkerrin et al., 2016), and a subsequent increased satisfaction with general life (Park, Park, & Peterson, 2010). It is also possible that more satisfaction with life in general leads to more positive emotions (Kesebir & Diener, 2008), which inhibit ED symptoms (Selby & Coniglio, 2020). Finally, a reduction in ED symptoms potentially increased chances of individuals achieving common sources of life meaning (Mulkerrin et al., 2016), including positive relationships with others (Schnell, 2011), leading to an increase in satisfaction with friendships. On the other hand, the development of supportive relationships during treatment might not only have led to increased satisfaction with friendships, but also act as a key factor in recovering from AN (Federici & Kaplan, 2008).

Contrary to our expectations and despite the positive findings regarding improvements in ED symptoms, an increase in satisfaction with normative life domains was not paralleled by an improvement in BMI. However, it is important to note that BMI might not be an adequate indicator of AN severity or recovery in this study, since individuals with both typical and atypical AN were included. This potentially complicates our findings in light of possible differences between individuals with typical and atypical AN (Garber et al., 2019; Sawyer, Whitelaw, Le Grange, Yeo, & Hughes, 2016). Unfortunately, the number of individuals with typical ($n = 49$) and atypical AN ($n = 20$) does not allow us to validly examine between-group differences (yet, the analyses showed similar patterns across the two groups in which an increase in satisfaction with normative life domains was not paralleled by an improvement in BMI; see Table B in the Supporting Information). Furthermore, the debate about how to define recovery from AN is still ongoing, with several authors calling for a broad definition of recovery (including physical, psychological, and behavioral indicators), with less focus on BMI (Dawson, Rhodes, & Touyz, 2015). Thus, an individual can reach a BMI that falls in the normal range, but still suffer from ED symptoms. Possibly, for these individuals, improvements in satisfaction with normative life domains might only set in when a reduction in ED symptoms is achieved.

Regarding the second hypothesis, relatively low satisfaction with normative life domains at baseline was not related to less improvement in AN symptoms. We expected that individuals with low satisfaction with normative life domains at the start of treatment would have less attentional resources to engage in normative life domains, potentially making it harder to recover. However, it appeared that the absolute level in baseline satisfaction was not related to the relative degree in improvement in AN symptoms. Together, the pattern of

findings seems to suggest that it is the change in satisfaction and not the absolute level of satisfaction that is most closely related to improvement of symptoms. It should, however, be acknowledged that the current time window was restricted to a 1-year interval and that a considerable number of participants were still in treatment at follow-up. Furthermore, the fact that participants in the current study received treatment as usual might have resulted in statistical noise, as it may be that treatment has to some extent been adjusted to between individual differences in satisfaction with normative life domains. It is, therefore, possible that variability in treatment approach might have moderated the relationship between baseline satisfaction with normative life domains and change in AN symptoms. On the basis of the current findings, it can thus not be ruled out that individual differences in baseline satisfaction are related to individual differences in longer term improvement of AN symptomatology.

Finally, the subsidiary analyses examined the potential role for importance ratings of normative life domains. Using cross-sectional methods, van Doornik, Ostafin, et al. (2021) did not find importance of normative life domains to differentiate between individuals with and without AN. In the present study, we similarly failed to find a systematic relationship between the importance ratings and reduction of AN symptoms. This pattern of findings seems to suggest that AN does not involve a reduction in importance of normative life domains. Thus, rather than addressing the importance of normative life domains, it may be more important to focus on pursuing and establishing satisfactory engagement with these life domains.

The current study has several important strengths. These include the inclusion of a relatively large number of adolescents with AN using a longitudinal design and relatively low drop-out rates. Furthermore, ED symptoms were assessed with both self-report and an interview. In addition to the strengths, five more study limitations should be addressed that are not already mentioned above. One limitation is that even though the use of a domain specific measure to examine satisfaction with normative life domains is an important step forward, a possible disadvantage is that using nomothetic domains may not be relevant to every participant. This might have contributed to the relatively low internal consistency of the BMSLSS at follow-up. To get a better idea of which life domains and goals are important in AN, it could be useful in future research to complement the current approach with idiographic measures of life goals, including type of goals, number of domains, and commitment to personal goals. Second, the relatively large age range in the present study (12 to 22 years) might complicate the interpretation of our findings. However, at baseline 91.3% of the participants were between 14 and 18 years of age and post hoc excluding participants outside of this age range from the main analyses did not affect the pattern of results (see for more details Table C and Figures 1 and 2 in the Supporting Information). Third, several researchers have suggested that the decrease in satisfaction with life commonly found in adolescence should be viewed as a developmental phenomenon (Goldbeck, Schmitz, Besier, Herschbach, & Henrich, 2007). As adolescence is a developmental phase associated with important somatic and psychosocial changes, developmental factors might have a relatively large

impact on satisfaction with normative life domains, regardless of whether an individual is dealing with an ED. As this might lead to an underestimation of the relevance of satisfaction for the persistence of AN symptoms, it would be important to replicate the current study in an adult sample. Likewise, the current participants were mostly young individuals who presented with their first episode of AN ($n = 62$), limiting the generalizability of our findings to individuals who developed a severe and enduring form of AN (SE-AN). For this latter group, lowered satisfaction with normative life domains might be especially relevant (Broomfield et al., 2021). Therefore, future studies should examine whether satisfaction with normative life domains might be an important target for SE-AN treatment, potentially improving longer term prognosis of these individuals. Fourth, while baseline ED severity was controlled for in the main analyses, it should be acknowledged that improvements of AN symptoms may also relate to improvements in other factors, such as self-esteem and depression symptoms, which were not included in the present study. Future research would thus benefit from including these factors in order to further delineate the unique contribution of satisfaction with normative life domains on eating disorder symptoms. Finally, as almost all of our participants were female and previous research suggests that life satisfaction may be differentially related to ED symptoms for men and women (Zullig, Pun, & Huebner, 2007), our findings may not generalize to males with AN.

To conclude, the present study indicates that an increase in satisfaction with normative life domains is related to improvement of ED symptoms in adolescents with AN. Specifically, improvements in ED symptoms were positively related to an increase in satisfaction with the self, life in general, and friendships. Furthermore, baseline satisfaction with normative life domains was unrelated to improvement in AN symptoms over time. Thus, this study provides preliminary evidence that satisfaction with normative life domains is a malleable factor which fluctuates with symptom severity in AN. As a critical next step, experimental research should test whether focusing on satisfaction with normative life domains during treatment could serve to improve AN symptoms. If this is the case, this would not only attest to the view that satisfaction with normative life domains has causal impact, but would also provide concrete starting points for improving current treatment options.

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CONFLICT OF INTEREST

The authors have no conflict to declare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy or ethical restrictions.

ORCID

Sanne F. W. van Doornik  <https://orcid.org/0000-0002-5826-5541>
 Brian D. Ostafin  <https://orcid.org/0000-0001-9739-2757>
 Nienke C. Jonker  <https://orcid.org/0000-0002-2567-3776>
 Klaske A. Glashouwer  <https://orcid.org/0000-0002-0883-1189>
 Peter J. de Jong  <https://orcid.org/0000-0002-3512-3663>

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SUPPORTING INFORMATION

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