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1 **Title:** Using the theory of planned behaviour to measure motivation for recovery in anorexia
2 nervosa

3 **Short title:** TPB in anorexia nervosa

4
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ABSTRACT

1
2 Anorexia nervosa (AN) is a difficult to treat mental illness associated with low motivation for
3 change. Despite criticisms of the transtheoretical stages of change model, both generally and in
4 the eating disorders (EDs), this remains the only model to have been applied to the understanding
5 of motivation to recover in AN. The aim of this pilot study was to determine whether the theory
6 of planned behaviour (TPB) would provide a good fit for understanding and predicting
7 motivation to recover from AN. Two studies were conducted – in the first study eight women
8 who had recovered from chronic AN were interviewed about their experiences of recovery. The
9 interview data was subsequently used to inform the development of a purpose-designed
10 questionnaire to measure the components of the TPB in relation to recovery. In the second study,
11 the resultant measure was administered to 67 females with a current diagnosis of AN, along with
12 measures of eating disorder psychopathology, psychological symptoms, and an existing measure
13 of motivation to recover (based on the transtheoretical model). Data from the interview study
14 confirmed that the TPB is an appropriate model for understanding the factors that influence
15 motivation to recover from AN. The results of the questionnaire study indicated that the pre-
16 intention variables of the TPB accounted for large proportions of variance in the intention to
17 recover (72%), and more specifically the intention to eat normally and gain weight (51%).
18 Perceived behavioural control was the strongest predictor of intention to recover, while attitudes
19 were more important in the prediction of the intention to eat normally/gain weight. The positive
20 results suggest that the TPB is an appropriate model for understanding and predicting motivation
21 in AN. Implications for theory and practice are discussed.

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INTRODUCTION

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Anorexia nervosa (AN) is a mental illness associated with low motivation to change, with motivational issues identified in the clinical literature since the earliest descriptions of the illness (Gull, 1874). People with AN often exhibit an extreme ambivalence towards change and are ego-syntonicly attached to their disorder (Attia, 2010). Low motivation to change has been linked to both high dropout from, and lack of engagement in, treatment (DeJong, Broadbent, & Schmidt, 2012; Serpell, Treasure, Teasdale, & Sullivan, 1999); while increased motivation has been associated with improved outcomes in selected studies (e.g., Wade, Frayne, Edwards, Robertson, & Gilchrist, 2009). Thus, measuring motivation in AN remains an area of clinical interest and is integral for designing effective interventions for this population.

The Transtheoretical Model of Change (TTM; Prochaska & DiClemente, 1982) has been the model of choice for understanding motivation in the eating disorders (EDs) (for a review see Hotzel, von Brachel, Schlossmacher, & Vocks, 2013). The TTM posits that in achieving behaviour change, individuals move through a series of discrete stages reflecting their increasing readiness for change (pre-contemplation, contemplation, preparation, action, and maintenance) before reaching the end point of engaging in and maintaining a new health behaviour, as well as including three other core concepts (processes of change, decisional balance, and self-efficacy), which support movement through the stages. Consistent with the TTM focus, a number of tools for assessment of motivation in AN have been developed based on the model (e.g., Geller, Cockell, & Drab, 2001; Gusella, Butler, Nichols, & Bird, 2003), the most popular of which is the Anorexia Nervosa Stages of Change Questionnaire (ANSOC-Q; Rieger et al., 2000).

1 Despite its popularity, reviews of the application of the TTM to eating disorders have
2 drawn mixed conclusions (Dray & Wade, 2012; Wilson & Schlam, 2004). Wilson and Schlam
3 found little relevance of the TTM; for example, demonstrating that stage of change predicted
4 neither treatment drop-out (Geller et al., 2001) or weight gain in patients with AN (Levy, Lucks,
5 & Pike, 1998). In contrast, Dray and Wade (2012) found that stage of change was predictive of
6 several treatment outcomes, including BMI and psychopathology; however, a strong connection
7 between stage of change and actual ED pathology could not be demonstrated. Similarly, an
8 intervention study, which employed the ANSOC-Q and several Likert scales to measure
9 motivation, found that the latter better predicted change from pre- to post-intervention (Wade et
10 al., 2009). These findings are consistent with the more general criticism of the model as failing to
11 predict behaviour (beyond the scope of this paper; however, for relevant reviews see Armitage,
12 2009; Armitage & Arden, 2002; Freeman & Dolan, 2001), and suggest that the TTM may be
13 limited in its utility to understand motivation and to predict recovery from an ED. Consequently,
14 this raises questions regarding the suitability of measures of motivation derived from the TTM,
15 and emphasises the need to continue to investigate and develop valid, reliable tools for assessing
16 motivation to change in AN (Wade et al., 2009).

17 Due to the focus on stage of change conceptualisations of motivation in AN, there has
18 been limited consideration of other factors that may impact desire for recovery. In contrast, in
19 other areas of psychology, various alternatives to the TTM have been proposed to explain
20 motivation to change. For example, the Theory of Planned Behaviour (TPB; Azjen, 1991) is a
21 widely used model in health and social psychology and has been successfully applied to the
22 prediction of a number of health intentions and behaviours, including, diet, physical activity,
23 smoking cessation, and condom use (Armitage & Conner, 2001). The TPB proposes that

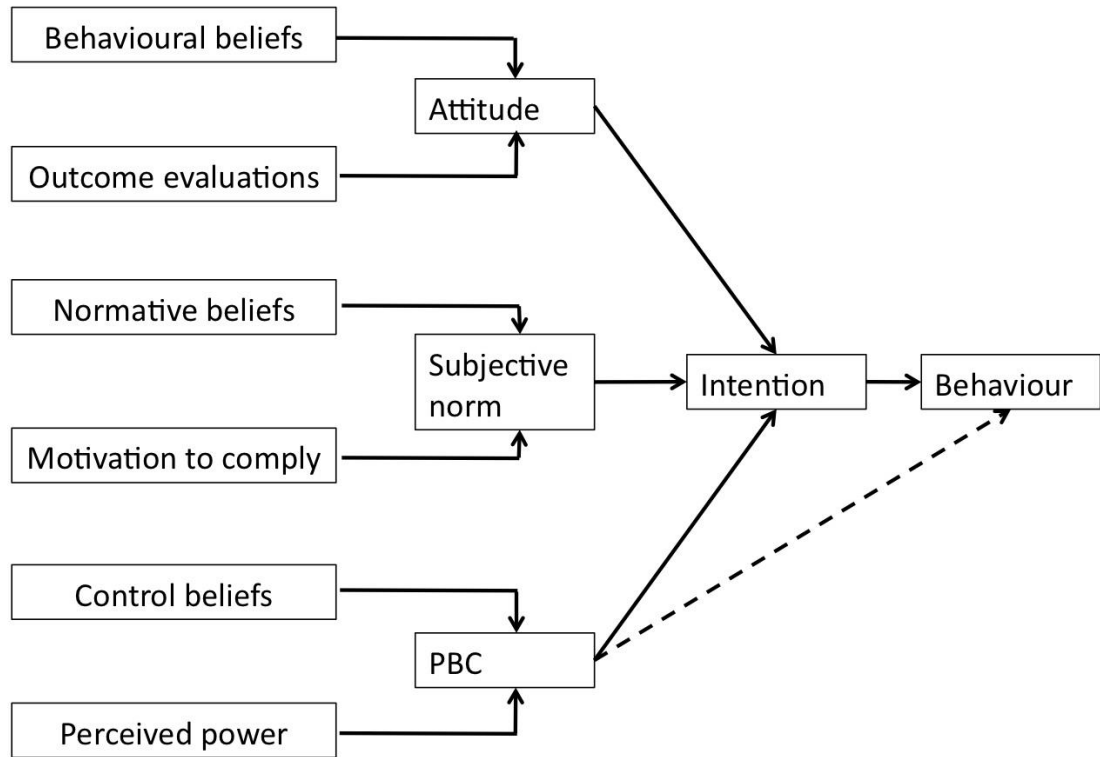
1 behaviour is directly influenced by one's intention to perform that behaviour (see Figure 1).
2 Intention is, in turn, influenced by three factors: 1) an individual's attitudes, which includes
3 beliefs about the likely outcomes of performing the behaviour (behavioural beliefs) and an
4 evaluation of the desirability of these outcomes (outcome evaluations); 2) subjective norms,
5 which includes perceptions of pressure from significant others to engage in the behaviour
6 (normative beliefs) and motivation to comply with such expectations; and 3) perceived
7 behavioural control (PBC), which reflects beliefs about any internal and external factors that
8 might facilitate or impede the performance of the behaviour (control beliefs) and the perceived
9 likelihood that these factors will actually impact behaviour (perceived power) (Ajzen, 1991).

10 The TPB has received extensive support in a diverse range of behaviours including
11 various dietary behaviours (Armitage & Conner, 2001; McEachan, Conner, Taylor, & Lawton,
12 2011). For example, it was found that individuals with more positive attitudes, and higher
13 perceptions of and control had more positive intentions to follow a gluten free diet (coeliac
14 disease patients; Sainsbury & Mullan, 2011; Sainsbury, Mullan, & Sharpe, 2013), to consume
15 the recommended amounts of fruit and vegetables (Kothe, Mullan, & Butow, 2012), and to
16 consume breakfast (Wong & Mullan, 2009). Consistent with the post-intentional phase of the
17 model, individuals with more positive intentions and better PBC were more likely to actually
18 engage in each of these behaviours than those with lower intentions and PBC (Armitage &
19 Conner, 2001; McEachan et al., 2011). Several meta-analyses including studies on a range of
20 behaviours (e.g., exercise, sunscreen use, self-examination, diet, and sexual behaviour) have
21 shown that the TPB is a superior model in explaining behaviour compared to the TTM and other
22 models of health behaviour (e.g., the health belief model and social cognitive theory) (Webb,
23 Joseph, Yardley, & Michie, 2010; Webb & Sheeran, 2006).

1 Although the TPB has never been explicitly applied to AN, additional factors that have
2 been identified as barriers to change in this population such as hopelessness and helplessness
3 (Waller, 2012), poor self-efficacy (Wade, Treasure, & Schmidt, 2011), and perceiving recovery
4 as impossible (Dawson, Rhodes, & Touyz, 2014), would all be encompassed by the components
5 of the TPB, suggesting that this may be an appropriate alternative to the TTM. Another potential
6 advantage of the TPB is the emphasis on conducting extensive formative research in order to
7 demonstrate that the theory is indeed appropriate for the target population and behaviour, and the
8 existence of guidelines for how to conduct such research to develop a TPB-based questionnaire
9 to measure the components of theory in relation to the target behaviour (Ajzen, 2006; Francis et
10 al., 2004).

11 Following these guidelines, the aim of the current pilot study was therefore to firstly,
12 identify the salient beliefs associated with recovery from AN in order to determine the
13 appropriateness of the TPB for use in this population; and secondly, to develop a purpose-
14 designed TPB measure to assess and predict intentions (akin to motivation) to recover from this
15 illness.

16



1

2 **Figure 1.** The Theory of Planned Behaviour

3

4 **Study 1: Elicitation interviews**

5 **Method**

6 *Participants and procedure*

7 The first phase of the research involved conducting in-depth interviews with eight women
 8 who were assessed as being fully recovered from chronic AN (defined as having suffered with
 9 the illness for seven years or more). Although this phase was not originally designed around the
 10 TPB, examination of the interview responses suggested that beliefs relevant to the TPB could be
 11 extracted and meaningfully used to develop the questionnaire, which was designed with the

1 purpose of assessing change in motivation across the course of an intervention. The reason for
2 selecting a recovered sample was to reduce any bias that might be associated with currently
3 being unwell and because factors perceived as being relevant to recovery by women who had not
4 yet achieved this state may not actually be indicative of recovery. Full recovery was defined as
5 having met the following criteria: (i) a body mass index between 20 and 25 kg/m² (placing
6 participants out of the under- or overweight range); (b) the absence of behavioural features of an
7 ED for a period of five years or more (e.g., restrictive eating, bingeing, purging); and (c)
8 currently scoring within one standard deviation of community norms on all subscales of the
9 Eating Disorder Examination: Restraint, Eating Concern, Weight Concern, and Shape Concern
10 (placing participants in the normal ranges for body-image concerns). The Eating Disorder
11 Examination (Fairburn & Cooper, 1993) is a standardized investigator-based interview that
12 measures the severity of the characteristic psychopathology of EDs and is considered the “gold-
13 standard” assessment tool in this area (Wilson, 1993). Past AN was assessed based on DSM-IV
14 criteria (American Psychiatric Association, 2000). Height and weight measurements were
15 obtained during the interview session.

16 Participants were recruited through the media, with details of the study published in
17 Australian national newspapers and broadcast on radio and television. The Eating Disorders
18 Examination was administered (over the phone) to thirty participants who identified as recovered
19 and appeared to meet criteria regarding the duration of illness. Of those screened, 19 were
20 excluded because they did not meet recovery criteria and three were unable to attend the
21 subsequent face-to-face interview. Thus, eight women were assessed as being fully recovered
22 and participated in the study. They ranged in age from 31 years to 64 years. Participants
23 estimated the number of years they had suffered from an ED as ranging from nine to 44 years

1 (average duration was 15.5 years). Participants also self-reported the number of years they had
2 been fully recovered, which ranged from five to 30 years (average duration was 13 years
3 recovered).

4 The final sample consisted of eight women who participated in one-to-one interviews
5 about their experiences of developing, living with, and eventually recovering from AN.
6 Rather than being structured around specific questions, women were invited to share the
7 story of their recovery including the process of recovery, the factors that they perceived as
8 being helpful and unhelpful in leading to change, their beliefs and attitudes about their illness
9 and recovery, and the people (e.g., friends and family and treatment team) who supported
10 their recovery. The initial prompt for sharing their story was “Can you tell me about your
11 journey to recovery from anorexia nervosa from start to finish?” Further prompts were
12 subsequently used as needed in order to obtain a complete understanding of the recovery
13 process (e.g., “What was helpful or unhelpful?”, “How important was [insert factor identified
14 by participant] in leading to your recovery?”, and “How would you summarise the key
15 factors that were most important in leading to your recovery?”). The interviews were used to
16 determine the appropriateness of the TPB for understanding recovery and to develop the
17 subsequent TPB questionnaire. Interviews lasted between one and one-and-a-half hours and
18 were audio-recorded and transcribed verbatim. All phases of the research (interviews and
19 questionnaire study) were approved by the University’s Human Research Ethics Committee.

20 *Analysis*

21 In line with TPB questionnaire development guidelines (Ajzen, 2006; Francis et al.,
22 2004), transcripts of the interviews were analysed to identify beliefs associated with recovery
23 specific to both the target behaviour (recovery) and population (those with AN). Specifically,

1 transcripts were examined to identify behavioural beliefs (advantages and disadvantages of
2 pursuing recovery from AN); normative beliefs (individuals and groups who would approve or
3 disapprove of pursuing recovery); and control beliefs (factors that impede or facilitate their
4 ability to pursue recovery).

5 **Results**

6 *Behavioural beliefs (advantages and disadvantages of recovery)*

7 Most participants recalled significant ambivalence towards recovery while they were
8 unwell with AN, and reported feeling unsure whether recovery would lead to positive or negative
9 changes. It was also common for participants to simultaneously hold positive and negative
10 beliefs about recovery. The advantages of recovery from AN identified included health benefits
11 and improvement in overall quality of life. The disadvantages included concerns over no longer
12 maintaining an ED identity or feeling special, and concern as to whether recovery would lead to
13 happiness or improvements in life (see Table 1).

14

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1 **Table 1.** Categories of beliefs identified in interviews

TPB variable	Examples of beliefs
Behavioural beliefs	<p data-bbox="613 365 1192 392">Recovery would change my life for the better</p> <p data-bbox="613 434 1216 462">Recovery would lead to improved relationships</p> <p data-bbox="613 504 1105 531">Recovery does not fit with my identity</p> <p data-bbox="613 573 1200 600">Recovery would mean I was no longer special</p> <p data-bbox="613 642 1300 669">Recovery would mean I could achieve other life goals</p> <p data-bbox="613 711 1032 739">I would be happier if I recovered</p> <p data-bbox="613 781 1174 808">Recovery would be beneficial for my health</p>
Normative beliefs	<p data-bbox="613 848 704 875">Family</p> <p data-bbox="613 917 709 945">Friends</p> <p data-bbox="613 987 976 1014">Others with eating disorders</p>
Control beliefs	<p data-bbox="613 1056 1021 1083">Recovery is difficult/impossible</p> <p data-bbox="613 1125 1008 1152">I am hopeful that I can recover</p> <p data-bbox="613 1194 829 1222">It is not up to me</p> <p data-bbox="613 1264 1052 1291">Recovery is not within my control</p> <p data-bbox="613 1333 1040 1360">I don't have the ability to recover</p>

2

3 *Normative beliefs (people who would approve/disapprove of recovery)*

4 Although references to normative beliefs were identified in the transcripts, these did not
5 appear to be a major factor when deciding whether or not to pursue recovery from AN. Despite
6 reports that participants knew that those who were important to them (i.e., friends and family)
7 wanted them to recover and had a strong desire to please these people (in particular their

1 families); these influences were not typically perceived as being enough of a motivator to
2 embark on recovery. Other people with EDs were identified as being both a positive (approving)
3 and negative (disapproving) influence on recovery.

4 *Control beliefs (factors or circumstances that aid/improve)*

5 Participants strongly endorsed that a lack of agency significantly impeded their ability to
6 recover from AN. Many individuals reported desiring recovery and perceiving its benefit;
7 however, the lack of belief in their capacity to achieve this appeared to hinder their attempts to
8 change. In contrast, improved self-efficacy was often reported to be an important factor in being
9 able to make significant changes and work towards recovery.

10 *Final questionnaire – Predicting Intentions to Recover from Anorexia Nervosa (PIRAN)*

11 The second phase of the research involved translating the findings from the interviews
12 into a purpose-designed questionnaire to measure motivation for recovery in AN (PIRAN).
13 Specifically, this involved categorising the interview responses into themes that mapped onto the
14 TPB components of attitude, subjective norms, and PBC. Questions were framed in terms of
15 their relation to “recovery from my eating disorder” and/or to the more specific behaviour of
16 “eating normally and gaining weight.” The reason for this decision was based on the observation
17 that patients with EDs commonly report being motivated for recovery but have minimal intention
18 or are ambivalent towards actually carrying out the behaviours that are necessary to reach this
19 goal (Schmidt & Treasure, 2006). The final questionnaire consisted of 25 items (intention: n = 4
20 items; e.g., “I intend to recover from anorexia nervosa”; attitudes: n = 7; e.g., “Recovery from
21 anorexia nervosa would be beneficial for my health”; subjective norm: n = 3; e.g., “Most people
22 who are important to me think I should eat normally and gain weight”; PBC: n = 11; e.g., “I have

1 the ability to recover from anorexia nervosa”). All items were measured using a 100-point
2 sliding scale, in which participants were required to move the bar to the point on the scale that
3 represented their level of agreement with each statement. Subscale scores represented the
4 weighted sum of all relevant items and higher scores in each case indicated more positive
5 intentions and attitudes, and higher perceptions of normative pressure and behavioural
6 control/self-efficacy (possible range for each subscale = 0 – 100).

7 **Study 2: Predictive Study**

8 **Method**

9 *Participants and procedure*

10 Participants were 67 females who were recruited to participate in an intervention to
11 improve motivation for recovery. Participants were from Australia (n = 31), USA (n = 18), UK
12 (n = 16) and Canada (n = 2), and were recruited from July 2013 to April 2014 by advertising
13 details of the study on a number of ED websites in Australia (e.g., National Eating Disorder
14 Collaboration) and the UK (e.g., B-EAT UK), Australian and American blogs (e.g.,
15 junealexander.com, dropitandeat.blogspot.com.au) and other social media platforms. Individuals
16 with all forms of clinically significant AN (including clinical and subclinical) were recruited.
17 Those with subclinical AN were included in order to assess the measure across all clinically
18 significant forms of AN and not merely individuals who met the strict diagnostic criteria for AN.
19 Participants were required to meet the following inclusion criteria: over 18 years of age, and
20 fulfil research criteria for AN phenotype, which were: (i) meeting criteria A and B of DSM-IV
21 for anorexia nervosa (A: refusal to maintain a normal body weight; B: intense fear of weight
22 gain); and (ii) BMI < 20 kg/m². Inclusion was determined based on the responses to questions

1 pertaining to the AN diagnosis from the Mini International Neuro-Psychiatric Interview
2 (Sheehan et al., 1998), as well as current BMI. While there are similarities between criteria i and
3 ii, important differences also exist – for example, an individual may have a BMI below 20
4 without refusing to maintain a normal body weight (i.e., engaging in deliberate food restriction in
5 order to maintain a low body weight or to control acquire a sense of control over food and body
6 weight).

7 The mean age of the sample was 29 years (SD = 9.95, range = 19 – 70), and participants
8 were generally well educated, with 72% having completed an undergraduate or post-graduate
9 degree. The mean age of onset of AN was 16.3 years (SD = 7.4), and participants had been
10 suffering from the illness for an average of 13.7 years (SD = 11.0, range = 1 – 55 years) at the
11 time of study participation. The participants were generally well educated, with 72% having
12 completed an undergraduate or post-graduate degree. Fifty-five participants (82%) met full
13 DSM-IV criteria for AN (based on responses to the MINI), and 12 participants (18%) were in the
14 subclinical range. The majority (75%) were currently receiving some form of treatment for their
15 ED.

16 *Measures*

17 Participants completed the purpose-designed TPB questionnaire (PIRAN; as described in
18 study 1), with questions for all TPB constructs being framed in relation to two distinct targets:
19 ‘recovery’ (i.e., in general) and ‘eat normally and gain weight’ (i.e., specific behaviours required
20 to achieve the general goal of recovery), as well as the following measures via an online survey:

21 The Anorexia Nervosa Stages of Change Questionnaire (Rieger et al., 2000) was used to
22 measure the primary outcome variable of motivation via stage of change. The ANSOC-Q is a 20-

1 item measure that assesses readiness to recover as measured by stage of change according to the
2 TTM (Prochaska, DiClemente, & Norcross, 1992). Each item refers to a specific anorexia
3 nervosa symptom and contains five statements representing the stages of change (pre-
4 contemplation, contemplation, preparation, action, and maintenance). For each item the
5 individual is asked to select the statement that best describes their current attitude or behaviour
6 regarding changing the nominated symptom (1-5). The total readiness to change score represents
7 the sum of all 20 items (range: 5-100), which is divided by the number of items to obtain the
8 stage classification score (range: 1-5; pre-contemplation: < 1.5; contemplation: 1.5 – 2.4;
9 preparation: 2.5 – 3.4; action: 3.5 – 4.4; maintenance: > 4.5). The measure has demonstrated
10 internal consistency, test-retest reliability and convergent, discriminant, concurrent and
11 predictive validity (Rieger, Touyz, & Beumont, 2002; Rieger et al., 2000).

12 ***Eating pathology.*** The Eating Disorder Examination-Questionnaire (EDE-Q; Beglin &
13 Fairburn, 1992) is a self-report questionnaire measure of ED psychopathology, which was
14 adapted from the ‘gold standard’ Eating Disorders Examination (Fairburn & Cooper, 1993). It
15 contains 36-items across four subscales: Restraint, Eating Concern, Shape Concern, and Weight
16 Concern. Each item is rated on a seven-point scale (0 – 6), reflecting either the frequency with
17 which the individual has engaged in the target behaviour, the number of days a symptom was
18 present, or the strength of the target symptoms. Subscale scores represent the weighted sum of
19 relevant items and range from 0 – 6; a total score can also be computed by summing the subscale
20 scores and dividing by four (range = 0 – 6). The EDE-Q has been validated in community
21 samples and has demonstrated robust psychometric properties. The EDE-Q measures behaviour
22 over a four-week period; however, for the purposes of the current study it was adapted to
23 measure a two-week period.

1 *Psychological symptoms.* The Depression, Anxiety, and Stress Scale (DASS 21;
2 Lovibond & Lovibond, 1995), is a 21-item self-report measure of the negative emotional states
3 depression, anxiety, and stress. Each item is rated on a scale from 0 (did not apply to me at all) to
4 3 (applied to me very much or most of the time); subscale scores represent the sum of all relevant
5 items, multiplied by two (so as to make comparable to the longer DASS-42). Subscale scores
6 range from 0 to 42, with higher scores indicating more severe/frequent symptoms. The DASS
7 has been shown to have strong psychometric properties (Brown, Chorpita, Korotitsch, & Barlow,
8 1997). The Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) is a
9 20-item self-report questionnaire that assesses current state mood. It includes 10 items relating to
10 positive affect (e.g., enthusiastic, excited) and 10 items relating to negative affect (e.g., hostile,
11 distressed). Each item is rated on a five-point scale from 1 (slightly or not at all) to 5 (extremely).
12 Subscale scores represent the sum of relevant items; scores range from 10 – 50, and higher
13 scores indicate higher levels of positive and negative affect respectively. The PANAS has been
14 shown to be a valid and reliable measure of affective responses (Crawford & Henry, 2004).

15 *Data analysis*

16 Initially a series of Pearson’s correlations were used to examine the associations between
17 the variables of interest (PIRAN variables, stage of change, ED psychopathology, depression,
18 anxiety, stress, and positive and negative affect). Two separate multiple regression analyses were
19 then conducted to determine the fit of the TPB in predicting intention to: (1) recover, and (2) eat
20 normally and gain weight (both as measured by the purpose-designed PIRAN questionnaire
21 described in study 1). In each case, the independent variables were attitudes, subjective norm,
22 and PBC (each framed separately in relation to recovery and eat normally/gain weight
23 respectively).

1 **Results**

2 *Descriptive statistics*

3 As can be seen in Table 2, TPB scores (PIRAN) were moderate for intention, attitude,
4 and subjective norm, and lower for PBC, particularly when assessed in relation to eating
5 normally/weight gain. The mean score for the ANSOC-Q fell in the preparation stage of change
6 (range: pre-contemplation to action; Rieger et al., 2002), while the mean score for the EDE-Q
7 placed participants 2.1 standard deviations above that observed in a female community sample
8 (Beglin & Fairburn, 1992). The mean score for positive affect fell 0.86 standard deviations
9 below the community mean, and placed participants at the 15th percentile (Crawford & Henry,
10 2004). The mean negative affect score fell 2.2 standard deviations above the community mean
11 and placed participants at the 93rd percentile (Crawford & Henry, 2004). The mean scores for
12 depression and stress fell in the moderate symptom category, while the mean score for anxiety
13 corresponded to severe symptoms (Lovibond & Lovibond, 1995).

14 **Table 2.** Mean scores on all the measures

Measure	Mean	SD	Range
Intention: recovery	64.7	18.2	16.7 – 100
Attitude: recovery	70.7	15.7	33 – 100
Subjective norm: recovery	58.3	30.4	0 – 100
PBC: recovery	45.1	17.5	5.5 – 75.3

Intention: eat/weight	47.6	24.2	0 – 97
Attitude: eat/weight	68.1	20.5	3.5 – 100
Subjective norm: eat/weight	58.4	26.2	0 – 95.5
PBC: eat/weight	37.5	18.2	0 – 71.3
ANSOC-Q	2.6	0.7	1.3 – 4.4
EDE-Q	4.0	1.2	0.8 – 5.8
Depression	18.2	6.0	7 – 28
Anxiety	15.5	4.8	7 – 26
Stress	19.0	4.5	9 – 28
PANAS- positive	22.9	7.1	11 – 44
PANAS- negative	26.6	9.6	12 – 48

1 Note: Predicting Intention to Recover from Anorexia Nervosa (PIRAN) scores are reported for
2 two distinct behaviours: recovery in general, and eat normally/gain weight, for each of the four
3 TPB constructs (intention, attitude, subjective norm, perceived behavioural control). PBC =
4 perceived behavioural control; ANSOC-Q = Anorexia Nervosa Stages of Change Questionnaire;
5 EDE-Q = Eating Disorders Examination Questionnaire; Depression, Anxiety, Stress scores were
6 derived from the Depression, Anxiety, Stress Scale (DASS); PANAS = Positive and Negative
7 Affect Scales. Possible range of scores: TPB = 1 – 100; ANSOC-Q = 1 – 5; EDE-Q = 0 – 6;
8 DASS subscales = 0 – 42; PANAS = 10 – 50.

1 *Relationship between the TPB measures (PIRAN), motivation, eating disorder psychopathology,*
2 *and depression, anxiety and stress*

3 The inter-correlations between PIRAN scores were all highly significant (see Table 3), as
4 were some of the correlations with the ANSOC-Q, DASS, and EDE-Q. Specifically, participants
5 who reported more positive intentions and attitudes, and higher perceptions of control scored
6 higher on the motivation measure (ANSOC-Q), while only attitudes (recovery and eat/weight)
7 and intention and PBC regarding eating normally/gaining weight were related to actual ED
8 psychopathology. Neither measure of subjective norms (recovery or eat/weight) was related to
9 motivation (as measured using the ANSOC-Q) or ED psychopathology. More negative attitudes
10 towards recovery were associated with higher levels of depression, anxiety, and stress, while
11 lower perceptions of control (recovery and eat/weight) were also related to increased depression
12 scores.

Table 3. Correlations between TPB variables, motivation, and psychological symptoms

	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Intention: recovery	.584***	.337**	.777***	.601***	.417***	.175	.462***	-.209	.457***	-.184	-.143	-.157
2. Attitude: recovery	-	.246*	.360**	.497***	.563***	.195	.233	-.266*	.410**	-.315**	-.264*	-.342**
3. Subjective norm: recovery		-	.505***	.095	.135	.732***	.045***	.014	.162	-.063	.154	.076
4. PBC: recovery			-	.413**	.275**	.388**	.710***	-.218	.484***	-.332**	-.167	-.151
5. Intention: eat/weight				-	.656***	.100	.403**	-.356**	.578***	-.101	-.225	-.205
6. Attitude: eat/weight					-	.082	.420	-.337**	.552***	-.130	-.098	-.219
7. Subjective norm: eat/weight						-	.403**	-.030	.064	-.120	.061	-.075
8. PBC: eat/weight							-	-.289*	.568***	-.249*	-.103	-.195
9. EDE-Q								-	-.454***	-	-.643***	.577***
										-.458***		
10. ANSOC-Q									-	-.232	-.144	-.235
11. Depression										-	.521***	.605***
12. Anxiety											-	.628***
13. Stress												

Note: PBC = perceived behavioural control; EDE-Q = eating disorders examination-questionnaire; ANSOC-Q = anorexia nervosa stages of change questionnaire; * $p < .05$, ** $p < .01$, *** $p < .001$.

1 *Predicting intention to recover from an eating disorder*

2 Attitudes towards recovery ($\beta = .357, p < .001$), subjective norms ($\beta = -.105, p > .05$), and PBC
3 ($\beta = .702, p < .001$), accounted for 71.8% of the variance in intention to recover from an ED (F
4 $_{3,63} = 53.57, p < .001$).

5 *Predicting intention to eat normally and gain weight*

6 Attitudes towards eating normally and gaining weight ($\beta = .528, p < .001$), subjective norms ($\beta =$
7 $-.072, p > .05$), and PBC ($\beta = .321, p < .01$), accounted for 50.4% of the variance in intention to
8 eat normally and gain weight ($F_{3,63} = 21.33, p < .001$).

9 **Discussion**

10 The aim of this innovative pilot study was to determine the utility of the TPB in
11 understanding the factors that influence motivation for recovery from AN, and subsequently to
12 predict intention to recover using the TPB. This was achieved by conducting a series of
13 recovery-focused interviews with individuals who had successfully recovered from AN, and the
14 development of a TPB-based questionnaire (PIRAN) to measure attitude, subjective norm, PBC,
15 and intention, which was then administered to a sample of individuals with a current diagnosis of
16 AN or subclinical AN. To our knowledge, this is the first study to apply a model of health
17 behaviour, other than the commonly used TTM, to recovery from AN, and the first attempt to
18 apply the TPB specifically in this area. The findings from the interview study revealed that many
19 of the beliefs about recovery from AN are indeed compatible with the components of the TPB,
20 while the predictive study confirmed that the pre-intention variables of the TPB (attitudes and

1 PBC) accounted for significant variance in intention to recover, and more specifically, intention
2 to eat normally and gain weight.

3 In the interview study strong themes of ambivalence regarding the process and outcome
4 of recovery (attitudes: advantages and disadvantages), and feelings of confidence and agency (or
5 lack thereof) towards making the required changes (PBC) emerged in participants' responses. In
6 the second phase of the study strong links to intention to recover and gain weight/eat normally
7 were observed, as well as ED psychopathology, and scores on the existing TTM-based measure
8 of motivation. Normative beliefs were less commonly identified in the interviews, or when they
9 were, participants stated that this alone was not enough of a motivation to actively pursue
10 recovery. Similarly, in the questionnaire study it was found that subjective norms were not
11 significantly associated with any of the motivation or psychopathology measures (intention,
12 ANSOC-Q, EDE-Q, DASS). In other food and eating research – for example, gluten free diet
13 adherence (Sainsbury & Mullan, 2011; Sainsbury et al., 2013), breakfast (Wong & Mullan,
14 2009), and saturated fat consumption (Mullan & Xavier, 2013) – subjective norm has also failed
15 to significantly predict intention. This consistency across similar behaviours may suggest that for
16 personal behaviours such as diet, normative influences may not be important. Alternatively,
17 specifically in the context of EDs, the thin ideal portrayed by the media (not measured here) may
18 be a more relevant social influence than what people close to the individual (i.e., friends and
19 family) think. Further, this relationship would be expected to be negative (i.e., greater
20 subscription to social pressure to achieve the thin ideal would predict less motivation to recover
21 from an ED), whereas greater normative pressure within the TPB is typically thought to
22 positively influence intentions to engage in the target behaviour. The finding is also consistent
23 with clinical research that suggests that supportive relationships alone are not sufficient to lead to

1 recovery-oriented behaviour (Dawson et al., 2014). Further research is required to clarify the
2 nature and extent of different social influences on recovery-oriented motivation and behaviour.

3 In contrast to typical TPB-based findings (39-44% of the variance in intention accounted
4 for) (Armitage & Conner, 2001; McEachan et al., 2011), prediction in this study reached 72% for
5 'recovery' and 51% for 'eat normally/gain weight', suggesting that the TPB provides a very
6 good fit for data on motivation for recovery from AN. The higher accounted variance in
7 'recovery' compared to 'eat normally/gain weight' may be reflect the common observation that
8 patients with EDs report strong motivation despite exhibiting ambivalence towards actually
9 carrying out the behaviours that are necessary to reach this goal (Schmidt & Treasure, 2006).
10 Alternatively, greater coverage of items in the recovery-oriented scales compared to eat
11 normally/gain weight may be responsible for the discrepancy.

12 Attitude is generally found to be the strongest predictor of intention, followed by PBC,
13 and subjective norm (Armitage & Conner, 2001; McEachan et al., 2011). A similar pattern was
14 observed here, although this also differed according to whether the target was 'recovery' or 'eat
15 normally/gain weight.' Consistent with the interview responses, for recovery, PBC was by far the
16 stronger influence ($\beta = .702$; attitude: $\beta = .357$), indicating that perceptions of self-efficacy are
17 key in determining motivation to embark on recovery. In contrast, for eating normally and
18 gaining weight, attitudes represented the greater influence ($\beta = .528$; PBC: $\beta = .321$), perhaps
19 reflecting the tendency of people with AN to struggle to see the bigger picture when faced with
20 an immediately anxiety-provoking situation (i.e., weak central coherence and set-shifting
21 abilities; Lopez, Tchanturia, Stahl, & Treasure, 2008).

1 It is typical in TPB studies to also assess the degree to which measures of intention and
2 PBC account for variance in actual behaviour. This was beyond the scope of this study for
3 several reasons; firstly, the primary research question was whether the TPB provided a good fit
4 to the data concerning *motivation* for recovery from AN. Secondly, the nature of recovery from
5 an ED is complex; it involves the performance of a number of different behaviours (e.g.,
6 reducing restrictive eating, bingeing and purging, weight gain, and challenging feared foods to
7 name a few), as well as occurring over a long period of time. Specifically, the average duration
8 of illness is seven years (Beumont & Touyz, 2003). Further, measures such as the EDE-Q
9 measure ED psychopathology (including both cognitive and behavioural aspects of an ED) rather
10 than behaviour per se, and therefore do not provide an appropriate measure of behaviour for use
11 in such analyses.

12 Despite this, some interesting relationships between PIRAN scores and ED
13 psychopathology were observed. Firstly, the magnitude of the correlations with the EDE-Q were
14 higher for eat normally/gain weight. Regarding recovery in general, only attitudes were
15 associated with ED psychopathology such that participants who had more negative attitudes
16 towards recovery had more severe ED symptoms. In contrast, more negative intentions and
17 attitudes, and lower perceptions of control in relation to eating normally and gaining weight were
18 all associated with more severe symptoms. This pattern provides further support for the need to
19 distinguish between motivation for recovery in general and more explicitly measuring
20 behaviours relevant to achieving this goal.

21 Relationships between the PIRAN questionnaire and the ANSOC-Q were also observed.
22 Although intentions, attitudes, and PBC (recovery and eat normally/gain weight) were all
23 significantly associated with current stage of change, stronger correlations were observed with

1 the behaviour-specific measures compared to recovery in general. An item examination of the
2 ANSOC-Q suggests that this is likely due to the more detailed nature of the questions in the
3 ANSOC-Q (e.g., weight gain, fear of fatness, weight control methods, and daily food
4 consumption) and the PIRAN-eat normally/gain weight scales, compared to the more general
5 recovery scales.

6 *Limitations and conclusions*

7 This study had some limitations that need to be considered when interpreting the results.
8 Firstly, the sample sizes in both studies were reasonably small and as such the results may not be
9 generalisable to the wider population of people suffering from AN. This is a criticism of most
10 research in anorexia nervosa including previous motivation research – for example, the ANSOC-
11 Q was based on only 44 patients with anorexia nervosa (Rieger et al., 2000). Further, the sample
12 included cases of subclinical AN, which may also limit generalisability. Secondly, as the
13 interview study was not originally designed around the TPB, some beliefs may have been missed
14 and nor was data saturation (for TPB constructs) necessarily reached. Despite this, the ease of
15 extracting TPB-relevant information from the interview data and the very high predictive power
16 of the model suggest that the TPB is an appropriate model for organising the cognitive factors
17 that impact recovery from AN. Thirdly, the resultant TPB-based measure has not yet been fully
18 validated in an ED population. More research is needed to examine its psychometric properties,
19 as well as its utility in longitudinally predicting recovery from AN, including the further
20 development of behaviour-specific scales. In particular, the development of direct measures of
21 the TPB constructs is needed so that these can be compared to the current interview-derived
22 measures, as well as additional analyses such as computing internal consistency estimates and
23 factor analysis to confirm the construct validity of the scales. Finally, direct comparisons

1 between the PIRAN and the existing ANSOC-Q in predicting behaviour were not possible and
2 although significant correlations provide some evidence for construct validity, more rigorous
3 comparison of the TTM and the TPB is necessary.

4 This pilot study is the first to apply a validated model of health behaviour, other than the
5 TTM, to the understanding and prediction of motivation to recover from AN and represents an
6 important first step in expanding this field. The findings demonstrated that the TPB does provide
7 a good fit to the data on recovery, and led to the development of a theoretically informed
8 measure for assessing motivation to recover in AN (PIRAN). Moving forward, formative
9 research is needed to expand the current findings and to determine the ways in which motivation
10 to engage in the specific behaviours involved in recovery (e.g., eating normally, gaining weight,
11 reducing bingeing and purging, meal plan compliance) are impacted by the combination of
12 attitudes, subjective norms, and perceived behavioural control. Specifically, this would involve
13 the development of behaviour-specific scales to measure the various component behaviours
14 involved in recovery from AN, and subsequently measuring performance rates of each behaviour
15 (e.g., weight gain, compliance with a specified meal plan, frequency of ED behaviours such as
16 bingeing and purging). This will not only improve understanding of how attitudes and
17 perceptions of control differ according to the particular behaviour in question, but also allow for
18 the development of more explicitly targeted interventions to improve motivation and behaviour
19 change in this difficult to treat population.

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