

## RESEARCH ARTICLE

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# Increases in positive emotions as precursors to therapeutic change

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## Abstract

Increases in positive emotions may not only be indicators of progress in therapy but also precursors to that improvement. Conducted in a psychology training clinic, this naturalistic, repeated-measures study tracked changes over the course of therapy in 34 clients' emotional experience and two of the primary targets of clinical interventions, symptom distress and relationship functioning. During treatment, positive emotions increased, negative emotions decreased, and improvements were seen in therapeutic outcomes. Positive and negative emotions were correlated, as were changes in positive and negative emotions. However, despite this association, increases in positive emotions were a significant predictor of concurrent improvements in symptom distress and relationship functioning, even when decreases in negative emotions were included in the same model. Additionally, positive emotions not only predicted change in these treatment outcomes over the same time period, but they also predicted future change. This study contributes to research on the critical role positive emotions play in psychotherapy and may encourage the development of interventions focusing on increasing positive emotions. These findings highlight the distinct functioning of positive emotions separate from negative and the value of attending to positive emotions during therapy.

## KEYWORDS

naturalistic methodology, positive emotions, relationship functioning, symptom distress, training clinic

## 1 | INTRODUCTION

A growing body of research is illuminating the adaptive role positive emotions can play in psychotherapy and the call for interventions that highlight positive emotions is loudening (e.g., Carl et al., 2013; Dunn, 2012, 2017; Ehrenreich et al., 2007; Vazquez, 2017). Due to the often overwhelming and uncontrollable experience of negative emotions in disorders such as anxiety and depression, the field's attention has historically focused on downregulating negative emotions to provide relief (Carl et al., 2013; Vazquez, 2017). However, an emphasis on upregulating positive emotions may allow for therapeutic change where traditional interventions have not succeeded (Carl et al., 2013; Taylor, Lyubomirsky, et al., 2017). New interventions

are rapidly being tested that incorporate upregulating positive emotions (e.g., Craske et al., 2019; Geschwind et al., 2020; Taylor et al., 2020). To further encourage these developments, basic questions of how positive emotional experiences shift over the course of psychotherapy and how these shifts correspond with transdiagnostic symptom reduction and relationship functioning need to be addressed.

### 1.1 | Theory of emotion

A common assumption in psychological theory is that the experience of emotions can be described as a bipolar scale with negative

emotions on one end of a single dimension and positive emotions on the other (Feldman Barrett & Russell, 1998). Though there is evidence supporting the bipolarity of negative and positive affect assumption (for a review, see Russell & Carroll, 1999), it rests on the study of emotion in a single instance rather than as a set of emotional experiences over time. When a longer period of time is considered, even one of intense stress, both positive and negative emotions are likely to co-occur (Folkman, 2008). Considering the occurrence of positive and negative emotions as orthogonal though, especially in the context of psychopathology, is also too extreme given that heightened negative affect and deficits in positive affect are characteristics of many disorders (Stanton & Watson, 2014). Changes in positive and negative emotions in treatment are also likely correlated. However, when it comes to the function of emotion, research in both the emotion and clinical literatures is demonstrating that positive and negative emotions should be assessed separately as they do not behave similarly in models of resilience or clinical outcomes (e.g., Boelen & Lenferink, 2020). For example, positive emotions predict increases in resilience and in life satisfaction, whereas negative emotions do not (Cohn et al., 2009). Rather than representing two ends of a single continuum, positive and negative emotions, when tracked over time, appear to have unique functionally adaptive roles.

## 1.2 | Broaden-and-build theory and resilience

Negative emotions are thought to focus attention and increase physiological reactivity in order to respond to an immediate threat and in an effort to enhance survival. The broaden-and-build theory (Fredrickson, 1998, 2001) posits that the experience of positive emotions, including discrete emotions such as joy, interest and love, broaden the thought-action repertoire, which in turn creates opportunity for building personal and psychological resources and triggers upward spirals toward well-being (Fredrickson & Joiner, 2002). Further study of the mechanisms of upward spirals suggests that positive emotions may shift attention and incentivize positive behaviours (Fredrickson & Joiner, 2018). Experiences of positive emotions encourage the growth of personal, social, emotional and intellectual resources that can facilitate coping in the future.

Studied in nonclinical populations, the 'building effect' of positive emotions leads to heightened resilience and coping. For example, a study of non-depressed undergraduates that measured positive and negative emotions daily for a month, with the modified differential emotions scale (mDES; Fredrickson et al., 2003), and measured trait resilience and life satisfaction before and after the month found that positive emotions predicted increases in both life satisfaction and resilience, whereas negative emotions had weak or null effects (Cohn et al., 2009). Furthermore, experiences of positive emotions mediated the association between earlier and later measures of resilience, whereas life satisfaction did not. Similarly, in a randomized controlled trial with a nonclinical sample of workers, it was found that when positive emotions were induced through a loving-kindness meditation, workers experienced a reduction in depressive symptoms and an

### Key Practitioner Message

- Both increases in positive emotions and decreases in negative emotions were indicators of concurrent therapeutic progress.
- However, change in positive and negative emotions over treatment should be measured separately because they accounted for independent variance in improvement of clients' symptom distress and relationship functioning.
- Only increases in positive emotions predicted *future* improvement in clients' symptom distress and relationship functioning.
- Therefore, measuring changes in positive emotions may provide practitioners with early signals of therapeutic progress.

increase in personal resources such as purpose in life and social support (Fredrickson et al., 2008). In a clinical population, experiences of positive emotions, as they broaden perspectives and enhance socio-emotional resources, may be key to triggering and sustaining symptom reduction and preventing relapse (Ehrenreich et al., 2007).

## 1.3 | Positive emotions and relationship functioning

Positive emotions, such as love and gratitude, play critical roles in relationships, yet research on emotional experience in relationships has been lopsided with greater emphasis put on emotions like contempt and anger (Yee et al., 2014). In line with the broaden-and-build theory, one key resource that positive emotions build is social connectedness. When positive emotions were heightened through the loving-kindness meditation described above, participants reported an increase in received social support and positive relations with others (Fredrickson et al., 2008). In a controlled relationship formation encounter study of individuals with social anxiety disorder, increases in positive emotions were the most robust predictor of later feelings of connectedness and desire to engage in future social activities with one's partner, above and beyond reductions in anxiety (Taylor, Pearlstein, et al., 2017). In a study of long-term marriages, couples in happy marriages expressed more positive emotions during a discussion about marital conflict (Carstensen et al., 1995). The differences in positive affect were significant between couples with high versus low marital satisfaction even when the conversation was focused on a negative topic. Experiences and expressions of positive emotions may be key to relationship functioning.

In a meta-analysis of the association between happiness and success, happiness—defined as the frequent experience of positive emotions—was correlated with success in a range of relationships from romantic partners to friendships and coworkers (Lyubomirsky et al., 2005). Happy people tended to have more fulfilling marriages

and to report greater satisfaction with those marriages. In addition, they reported having a greater number of friends. The authors also found that happy individuals experience greater work success; they were more likely to obtain a job interview, receive high performance ratings and experience greater job satisfaction. Possibly this was because people with higher dispositional positive affect reported higher levels of emotional and tangible support from coworkers and supervisors. However, there is little research that describes how changes in positive emotions relate to changes in relationship functioning, especially during psychological treatment in a community-type setting.

## 1.4 | Positive emotions in psychopathology

Anhedonia is a critical component of depression that represents a marked reduction in a person's experience of positive emotions. One possible mechanism for the development of anhedonia is impairment in reward processing system (Borsini et al., 2020; Halahakoon et al., 2020). Unfortunately, anhedonia often proves resistant to improvements in current treatments (Brown, 2007; Carl et al., 2013). A secondary analysis of two randomized control trials examining changes in positive and negative affect when depression was treated with anti-depressant medication and/or cognitive therapy found that, across treatments, there was smaller repair in positive affect than in negative affect and that the disturbance in positive affect remained more pronounced than that in negative affect at the conclusion of treatment (Dunn et al., 2020). Another study of positive and negative affect during partial hospitalization treatment for depression found that pretreatment positive affect predicted depressive symptoms at posttreatment, above and beyond pretreatment negative affect and the interaction of positive and negative affect (Oren-Yagoda et al., 2018). These findings highlight the value of assessing positive and negative emotions separately and suggest that new interventions that target positive emotion may be warranted. Further work is needed to see if similar results are found when tested in a transdiagnostic community-type outpatient setting.

The avoidance behaviour that is characteristic of anxiety can lead to reduced engagement in pleasurable activities (Carl et al., 2013). Anxiety also creates an attentional bias toward threatening stimuli (MacLeod et al., 1986), which suggests that those with anxiety might not attend to positive stimuli as often. Adults with anxious or avoidant attachment styles perceive themselves as less able to upregulate positive emotions and less likely to savour positive events (Palmer & Gentzler, 2018). A meta-analysis of studies examining social anxiety and positive affect found an inverse association such that increased social anxiety symptoms were related to diminished positive experiences (Kashdan, 2007). The association was stronger in clinical samples than in college populations. In a treatment study of individuals with panic disorder and generalized anxiety disorder, Taylor, Knapp, et al. (2017) found that those with higher dispositional levels of positive emotions at pretreatment experienced greater decrease in anxiety symptoms at over time. A key next step is understanding how positive and negative emotions change over time alongside reduction in symptom distress.

Reduced relationship functioning often accompanies depression and anxiety disorders. Marital distress and poor social integration may be both antecedents and consequences of depressive symptoms (for a review, see Barnett & Gotlib, 1988). Worsening psychosocial impairment significantly increases the likelihood of reoccurrence in panic disorder and generalized anxiety disorder (Rodriguez et al., 2005). Interventions that address increasing positive emotions may be key to enhancing impairment in relationship functioning. For example, a positive emotion amplification intervention conducted with individuals with depression or anxiety significantly increased social connectedness compared to a control group at both post-treatment and 6 months later (Taylor et al., 2020). However, it is not known how positive emotions may shift alongside relationship functioning over the course of standard psychotherapy.

## 1.5 | Generators of change

Key theories about the role that positive emotions might play in psychopathology have been posited (e.g., Carl et al., 2013; Fitzpatrick & Stalikas, 2008; Garland et al., 2010), and the empirical base in support of positive emotions interventions in clinical samples is rapidly growing (e.g., positive affect treatment, Craske et al., 2019; positive activity intervention, Taylor, Lyubomirsky, et al., 2017; positive cognitive behavioural therapy, Geschwind et al., 2019, 2020; integrative positive psychological intervention for depression, Chaves et al., 2019). These promising interventions point to a growing interest in positive emotions as a treatment target. Understanding the trajectory of positive emotional experience over the course of therapy will help set the groundwork for future intervention studies. One theory of positive emotions in psychopathology suggests that positive emotions may not be simple indicators of therapeutic change but generators of that change (Fitzpatrick & Stalikas, 2008). Studies that can parse the time sequence of therapeutic change and shifts in positive emotions are needed.

## 1.6 | Research in a psychology training clinic

Research conducted in psychology training clinics helps us bridge science and practice (Neufeldt & Nelson, 1998; Borkovec, 2004; for systematic reviews of research in training clinics, see Todd et al., 1994; Dyason et al., 2019). Training clinics are often embedded in research universities facilitating the collection of data, and yet they also share more similarities to community clinics than randomized-controlled trials do: Services are offered to clients experiencing a wide range of disorders, therapy is conducted by many therapists, the length of therapy varies greatly, the session content is not manualized, and theoretical orientation is usually dictated by the supervisors available. The methodological challenges posed by this set-up deter researchers who are more accustomed to the experimental design that allows for the delimitation of the problem area (Messer & Boals, 1981). However, this real-world setting provides us with access to data that can address foundational questions about how emotional experience

naturally shifts for a range of clients in a variety of treatments. As with other studies that use naturalistic methodology, the investigation of emotional experience in this therapy setting sacrifices standardization that allows for isolation of the phenomenon of interest in order to gain a more ecologically valid picture of the average clients' emotional experience during real-world treatment.

## 1.7 | The current study

The present study was an investigation of the changes in positive and negative emotional experiences over the course of psychotherapy provided in a university training clinic. By examining the trajectories of how frequently these emotions were experienced and how those trajectories map onto symptom reduction and relationship functioning, this study strengthens the foundation for research on positive emotions in psychotherapy, which a nascent literature suggests may be a key target of intervention. This study builds off the associations noted in the existing literature by examining change in emotion over time rather than trait level pretreatment (Taylor, Knapp, et al., 2017), by taking a transdiagnostic approach in an outpatient setting rather than one disorder in an intensive treatment setting (Oren-Yagoda et al., 2018) and by studying change in emotion and treatment outcomes in a community-type setting rather than during a positive emotion intervention (Taylor et al., 2020). This study had two broad aims.

The first aim was to examine and describe the trajectory of clients' positive and negative emotions as well as symptom distress and relationship functioning during therapy. We hypothesized that over time in therapy, positive emotions increase, negative emotions decrease, symptom distress decreases, and impairment in relationship functioning decreases. We also expected a significant negative association between change in positive and change in negative emotions.

The second aim was to test whether change in positive emotions has unique predictive value, independent of change in negative emotions, for improvements in symptom distress and relationship functioning. We tested associations between concurrent changes in emotions and treatment outcomes as well as prospective associations (changes in emotion predicting subsequent therapeutic outcomes). Despite an expected correlation between positive and negative emotions, we did not expect those variables to act as opposite poles of a single continuum that changed entirely in tandem, and therefore, we predicted that changes in positive emotions would have predictive value for treatment outcomes that was *independent* of changes in negative emotions. Additionally, we examined whether change in positive emotions is a unique *precursor* of therapeutic change. On the basis of the idea that positive emotions trigger an upward spiral and are generators of therapeutic change, we hypothesized that changes in positive emotions would explain variance in future symptom distress and relationship impairment. As generators of change (Fitzpatrick & Stalikas, 2008), increases in positive emotions may precede improvements in treatment outcomes.

## 2 | METHOD

Participation was offered to adults seeking psychotherapy at the UCLA psychology clinic. There were no exclusion criteria based on diagnosis, experience of therapist, length of treatment or theoretical orientation. Thirty-four participants ( $M_{\text{age}} = 30.03$  years, range = 20–46, 74% female) had attended at least the intake and eight therapy sessions when COVID-19 disrupted in-person services. The majority of participants presented for treatment of depressive disorders (76.5%) and anxiety disorders (64.7%). Additional diagnoses at intake included trauma disorders (17.7%), obsessive compulsive disorder and related disorders (17.7%) and substance use disorders (14.7%). Therapists in the clinic were second, fourth or fifth year students in the affiliated clinical psychology PhD programme. The clinic offers therapy from a range of therapeutic orientations based on the supervisor's recommendation and expertise, most commonly cognitive behavioural, psychodynamic, acceptance and commitment, dialectical behavioural or integrationist. Therapy sessions are scheduled weekly, and the length of therapy is primarily determined by patient need which means the session count can vary greatly. The average length of therapy in the training clinic is 15 sessions. All therapists receive at least 1 h of supervision per week from either a licensed psychologist or an advanced student supervisor who in turn receives at least 1 h/week of supervision from a licensed psychologist.

Participants consented to completing the emotions measure at the intake appointment and at every fifth therapy session and to granting the researchers access to their clinical charts. As part of clinic protocols for routine care, therapists administered the measure of symptom distress and relationship functioning to their clients on the same timeline. Thirty-two participants completed the emotion and outcome measures on at least three, and up to five, occasions. Two additional participants completed one of the measures only twice. In total, there were 123 observations of emotions and 136 observations of outcome (see Table 1 for number of surveys per time point). The study received approval for the procedures described here from the Institutional Review Board of the University of California, Los Angeles (IRB#18-000354).

### 2.1 | Modified differential emotions scale

A broad array of low- and high-activation positive emotions (10 items) and negative emotions (8 items) were measured with the modified Differential Emotions Scale (mDES; Fredrickson et al., 2003), a self-report measure of how often a participant experienced a range of discrete emotions in the past week. Fredrickson et al. (2003) modified the original Differential Emotion Scale (Izard, 1977) to include additional positive emotions. Each emotion is presented as a triplet with three synonyms for each emotion (e.g., glad/happy/joyful). The positive emotions subscale covers the following emotions: amusement, awe, contentment, desire, gratitude, happiness, hope, interest, love and pride. The negative emotions subscale assesses the following emotions: anger, contempt, disgust, embarrassment, fear, guilt,

**TABLE 1** Descriptive statistics of emotion and outcome measures at each Time point

Scale		T1	T2	T3	T4	T5
mDES		<i>n</i> = 33	<i>n</i> = 29	<i>n</i> = 29	<i>n</i> = 20	<i>n</i> = 12
	Possible range	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)
PE	0–4	1.85 (.68)	1.97 (.73)	2.00 (.68)	2.02 (.75)	2.37 (.77)
NE	0–4	2.18 (.83)	1.84 (.87)	1.71 (.88)	1.81 (.88)	1.86 (.83)
OQ		<i>n</i> = 34	<i>n</i> = 32	<i>n</i> = 33	<i>n</i> = 23	<i>n</i> = 14
	Possible range	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)
OQ SD	0–100	52.76 (14.93)	50.28 (16.43)	48.94 (16.88)	44.65 (18.07)	43.43 (16.64)
OQ IR	0–44	18.71 (7.42)	18.13 (8.23)	18.70 (7.48)	16.96 (8.29)	16.71 (7.14)

Note: PE denotes positive emotion, NE denotes negative emotion, OQ denotes outcomes questionnaire, SD denotes symptom distress subscale, and IR denotes interpersonal relations subscale. Higher scores on OQ scales indicate poorer functioning.

sadness and shame. The two mDES subscales have strong internal reliabilities, ranging from 0.82–0.94 (Cohn et al., 2009; Fredrickson et al., 2008), and a large exploratory factor analysis revealed one positive emotion factor and two negative emotions factors that together comprise the negative emotions subscale (Galanakis et al., 2016). Participants rated each emotion item based on their experiences in the past week on a 5-point Likert scale (0 = *never*, 4 = *most of the time*). Responses to the mDES are scored by averaging the items in each subscale.

## 2.2 | Outcome questionnaire 45.2

Symptom distress and relationship functioning were assessed with two subscales from the Outcome Questionnaire (OQ) 45.2 (Lambert et al., 1996). This questionnaire is commonly used in clinical settings and is a well-validated transdiagnostic measure of areas of functioning (Beckstead et al., 2003; Boswell et al., 2013). Participants rated each item based on their experiences in the last week on a 5-point (0–4) Likert scale (*never*, *rarely*, *sometimes*, *frequently*, *always*). Item ratings are summed to calculate total and subscale scores. The symptom distress subscale consists of 25 items has a range of 0–100 with a clinical cut-off score of 36 and a reliable change score of 10. Some sample items include: “I blame myself for things,” “I have thoughts of ending my life,” and “I have an upset stomach.” The 11-item interpersonal relations subscale, which assesses relationship functioning, has a range of 0 to 44 with a clinical cut-off score of 15 and a reliable change score of 8. Some sample items include: “I have trouble getting along with friends and close acquaintances,” “I feel lonely,” and “I have frequent arguments.” Higher scores on both subscales indicate poorer functioning.

## 2.3 | Time points

Steps were taken to standardize and account for the survey administration timing. Surveys were at times skipped or administered multiple times in a short period due to clients running late, therapists administering the OQ off schedule, transfer of therapists or clinic staff

technical errors. When the mDES survey was missed at the appropriate fifth session, the clinic staff were instructed to administer another as soon as possible. The data set was structured with a time point variable to represent each wave of data collection (baseline, Session 5, Session 10, etc.) and account for some of the variability in survey administration timing (Time point 1 [T1]: intake or Session 1; T2: Sessions 4–7; T3: Sessions 8–13; T4: Sessions 14–17; and T5: Sessions 18–22). For each participant, if a survey was administered on multiple occasions within the same time point, the session where the mDES and OQ were administered at the same time was selected. If the measures were not administered at the same session, the sessions closest to the fifth session mark were selected.

Data were stored in SPSS v.26 and analysed with SAS Studio Proc Mixed using Restricted Maximum Likelihood estimation. In all models, the intercept was treated as a random effect, and all predictors were treated as fixed effects. The covariance structures were unstructured. The data set was screened for outliers at the observation level and the between-subject level. Neither examination revealed any outliers as defined as values more than three standard deviations above the mean.

## 3 | RESULTS

### 3.1 | Aim 1: Change over time, and the association between positive and negative emotions

Descriptive statistics for the mDES and OQ subscales at each time point are presented in Table 1. At time point 1, 91.2% of participants' scores on the OQ symptom distress subscale were at or above the clinical cut-off of 36, and 67.6% of participants' scores on the OQ relationship functioning subscale were at or above the clinical cut-off of 15. It should be noted that Table 1 presents between-person values; all other analyses presented in this paper were conducted using multilevel modelling.

Two-level multilevel models (time points nested within individuals) tested the linear trend of positive emotions, negative emotions, symptom distress and relationship functioning over time. A level-1 time variable, *EmoTimeSinceIntake*, was created that counted the

number of days between a participant's intake, and the date each mDES was administered. In a model with EmoTimeSinceIntake predicting positive emotions, there was a significant intercept ( $b_{00} = 1.84, p < 0.001$ ) and an expected significant increase in positive emotions each day after intake ( $b_{10} = 0.002, p < 0.001$ ). In a model with EmoTimeSinceIntake predicting negative emotions, there was a significant intercept ( $b_{00} = 2.10, p < 0.001$ ) and an expected significant decrease in negative emotions each day after intake ( $b_{10} = -0.002, p = 0.002$ ). For positive emotions, the quadratic trend was not significant when the linear trend was included in the model (intercept:  $b_{00} = 1.85, p < 0.001$ ; linear:  $b_{10} = 0.002, p = 0.327$ ; quadratic:  $b_{20} = 2.9E-6, p = 0.690$ ). The same was true for the negative emotions model (intercept:  $b_{00} = 2.17, p < 0.001$ ; linear:  $b_{10} = -0.005, p = 0.013$ ; quadratic:  $b_{20} = 0.00001, p = 0.155$ ).

A second level-1 time variable, OQTimeSinceIntake, was created to count the number of days between a participant's intake, and the date each OQ was administered. In a model with OQTimeSinceIntake predicting OQ symptom distress, there was a significant intercept ( $b_{00} = 52.92, p < 0.001$ ) and an expected significant decrease in OQ symptom distress each day after intake ( $b_{10} = -0.05, p < 0.001$ ). In a model with OQTimeSinceIntake predicting OQ interpersonal relations, there was a significant intercept ( $b_{00} = 18.88, p < 0.001$ ) and an expected significant decrease in OQ interpersonal relations each day after intake ( $b_{10} = -0.01, p = 0.009$ ).

The association between positive and negative emotions was first examined at each time point, and then the association between the change in positive emotions and the change in negative emotions between each time point was examined. In a multilevel model with positive emotions predicting negative emotions and controlling for time since intake ( $b_{20} = -0.00, p = 0.10, ns$ ), there was a significant intercept ( $b_{00} = 3.20, p < 0.001$ ) and a significant decrease in negative emotions for every 1-point increase in positive emotions ( $b_{10} = -0.60, p < 0.001$ ). In the reverse analysis with negative emotions predicting positive emotions and controlling for time since intake ( $b_{20} = -0.00, p = 0.025$ ), there was a significant intercept ( $b_{00} = 2.62, p < 0.001$ ) and a significant increase in positive emotions for every 1-point decrease in negative emotions ( $b_{10} = -0.37, p < 0.001$ ). A lagged multilevel model tested the association between concurrent change in positive and negative emotions. In a model with positive emotions predicting negative emotions—controlling for negative emotions at the previous time point ( $b_{20} = 0.60, p < 0.001$ ), positive emotions at the previous time point ( $b_{30} = 0.21, p = 0.11$ ), and time since intake ( $b_{40} = 0.00, p = 0.318, ns$ )—there was a significant intercept ( $b_{00} = 1.11, p = 0.002$ ) and an expected significant decrease in negative emotions for every 1-point increase in positive emotions ( $b_{10} = -0.52, p < 0.001$ ). In the reverse analysis with negative emotions predicting positive emotions—controlling for positive emotions at the previous time point ( $b_{20} = 0.62, p < 0.001$ ), negative emotions at the previous time point ( $b_{30} = 0.19, p = 0.037$ ), and time since intake ( $b_{40} = 0.00, p = 0.123, ns$ )—there was a significant intercept ( $b_{00} = 0.92, p = 0.002$ ) and an expected significant increase in positive emotions for every 1-point decrease in negative emotions

( $b_{10} = -0.36, p < 0.001$ ). Of note, in the reverse analysis lagged model, negative emotions at the previous time point were a significant predictor of positive emotions, whereas in the lagged model with positive emotions predicting negative emotions, the positive emotions at the previous time point predictor was not significant.

## 3.2 | Aim 2: Predictive value of change in positive emotions

A series of 12 two-level multilevel models with lags tested whether change in positive emotions had unique predictive value, independent of change in negative emotions, for improvements in symptom distress and relationship functioning. Figure 1 depicts the difference in timeframe between the concurrent change and prospective change models. The first six models tested concurrent change: the association between the change in emotions from one time point to the next and the change in treatment outcomes over the same timeframe (see Table 2). These models were used to ask whether change in positive emotions explain unique variance in the simultaneous change in treatment outcomes. The subsequent six models tested prospective change: the association between the change in emotions from one time point to the next and the change in treatment outcomes from the same starting time point to two time points later (see Table 3).

### 3.2.1 | Concurrent change: Symptom distress

As presented in Table 2, Model 1—a single-lag multilevel model—tested whether positive emotions predicted OQ symptom distress, controlling for positive emotions at the previous time point, OQ symptom distress at the previous time point and days since intake. In Model 2, negative emotions predicted OQ symptom distress, controlling for negative emotions at the previous time point, OQ symptom distress at the previous time point and days since intake. Next, in Model 3, changes from one time point to the next in positive and negative emotions were then tested within the same model to examine whether they accounted for the same or independent variance in change over the same timeframe in OQ:

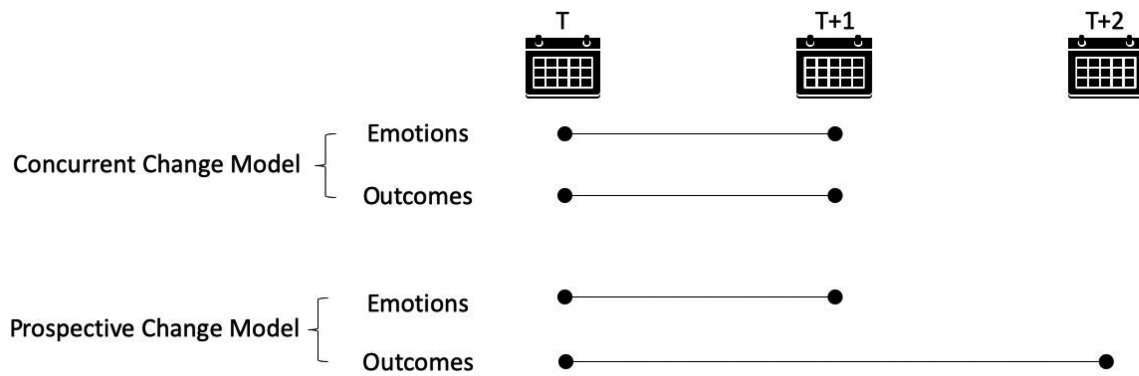
Level 1: Time point

$$\begin{aligned} \text{OQSymptomDistress}_{ij} = & \pi_{0i} + \pi_{1i}(\text{PositiveEmotion})_{ij} \\ & + \pi_{2i}(\text{NegativeEmotion})_{ij} \\ & + \pi_{3i}(\text{PositiveEmotion\_Lag})_{ij} \\ & + \pi_{4i}(\text{NegativeEmotion\_Lag})_{ij} \\ & + \pi_{5i}(\text{OQSymptomDistress\_Lag})_{ij} \\ & + \pi_{6i}(\text{OQTimeSinceIntake})_{ij} + e_{ij}. \end{aligned}$$

Level 2: Individual

$$\pi_{0i} = b_{00} + u_{0i},$$

$$\pi_{1i} = b_{10},$$



**FIGURE 1** Timeframe differences for emotion predictors and treatment outcomes in the concurrent change multilevel model with a single lag and the prospective change multilevel model with two lags

**TABLE 2** Concurrent change in positive and negative emotions predicting symptom distress and relationship functioning

	Concurrent change					
	OQ symptom distress			OQ interpersonal relations		
	Model 1: PE Estimate (SE)	Model 2: NE Estimate (SE)	Model 3: PE and NE Estimate (SE)	Model 4: PE Estimate (SE)	Model 5: NE Estimate (SE)	Model 6: PE and NE Estimate (SE)
<b>Fixed effects</b>						
1. Intercept	10.82 (5.68)	1.66 (3.42)	8.21 (4.86)	4.65 (2.48)	1.08 (1.62)	3.55 (2.44)
2. PE	-11.73*** (1.55)	—	-8.63*** (1.44)	-4.74*** (0.80)	—	-3.70*** (0.82)
3. PE one lag	8.28*** (1.74)	—	6.28*** (1.53)	3.49*** (0.88)	—	2.86** (0.85)
4. NE	—	9.30*** (1.35)	6.40*** (1.20)	—	3.38*** (0.70)	2.17** (0.68)
5. NE one lag	—	-4.30** (1.51)	-3.11* (1.26)	—	-1.95** (0.73)	-1.39* (0.66)
6. OQ one lag	0.83*** (0.07)	0.73*** (0.08)	0.74*** (0.08)	0.82*** (0.07)	0.77*** (0.08)	0.79*** (0.08)
7. OQ time since intake	0.02 (0.01)	0.01 (0.02)	0.02 (0.01)	0.01 (0.01)	0.00 (0.01)	0.01*** (0.01)

Note: OQ denotes outcomes questionnaire. The OQ one lag subscale score included in Row 6 corresponds with the outcome variable OQ subscale (i.e., symptom distress or interpersonal relations). PE denotes positive emotion. NE denotes negative emotion.

\* $p < 0.05$ . \*\* $p < 0.01$ . \*\*\* $p < 0.001$ .

**TABLE 3** Prospective change in positive and negative emotions predicting symptom distress and relationship functioning

	Prospective change					
	OQ symptom distress			OQ interpersonal relations		
	Model 7: PE Estimate (SE)	Model 8: NE Estimate (SE)	Model 9: PE & NE Estimate (SE)	Model 10: PE Estimate (SE)	Model 11: NE Estimate (SE)	Model 12: PE and NE Estimate (SE)
<b>Fixed effects</b>						
1. Intercept	15.78 (11.89)	5.46 (7.80)	10.22 (11.27)	8.30 (4.78)	6.87* (3.21)	8.00 (5.01)
2. PE one lag	-10.22*** (2.48)	—	-8.09** (2.70)	-2.99** (1.10)	—	-2.73* (1.25)
3. PE two lags	6.22* (2.96)	—	5.30 (2.90)	2.18 (1.30)	—	2.06 (1.33)
4. NE one lag	—	7.60** (2.20)	4.58 (2.30)	—	1.59 (0.97)	0.58 (1.05)
5. NE two lags	—	-6.53* (2.69)	-5.49* (2.55)	—	-1.49 (1.09)	-1.03 (1.08)
6. OQ two lags	0.73*** (0.13)	0.82* (0.15)	0.85*** (0.16)	0.66*** (0.12)	0.72*** (0.14)	0.73*** (0.14)
7. OQ time since intake	0.00 (0.03)	-0.02 (0.03)	0.00 (0.03)	-0.01 (0.01)	-0.02 (0.02)	-0.01 (0.02)

Note: OQ denotes outcomes questionnaire. The OQ one lag subscale score included in Row 6 corresponds with the outcome variable OQ subscale (i.e., symptom distress or interpersonal relations). PE denotes positive emotion. NE denotes negative emotion.

\* $p < 0.05$ . \*\* $p < 0.01$ . \*\*\* $p < 0.001$ .

$$\pi_{2i} = b_{20},$$

$$\pi_{3i} = b_{30},$$

$$\pi_{4i} = b_{40},$$

$$\pi_{5i} = b_{50},$$

$$\pi_{6i} = b_{60}.$$

In Model 1, the positive emotion coefficient reported in the second row indicates that an increase in positive emotions from one time point to the next was a significant predictor of improvements over the same timeframe in symptom distress. In Model 2, change in negative emotions was a significant predictor of concurrent change in symptom distress (see Row 4). In Model 3, both the positive and negative emotions coefficients remain significant (see Rows 2 and 4) suggesting that an increase in positive emotions was a significant predictor of a concurrent improvement in symptom distress, even when change in negative emotions was included in the same model.

### 3.2.2 | Concurrent change: Relationship functioning

Models 4–6 are identical to the first three models except the outcome for each is the OQ interpersonal relations subscale, and they control for this subscale at the previous time point. Likewise, the results parallel those from the first three models with both change in positive emotions and change in negative emotions predicting improvement in relationship functioning (see Model 4, Row 2 and Model 5, Row 4). When changes in positive and negative emotions are placed in the same model, they both remain significant (see Model 6, Rows 2 and 4).

### 3.2.3 | Prospective change: Symptom distress

Next, multilevel models with two lags tested if change in positive emotions had unique predictive value as compared to change in negative emotions on prospective changes in symptom distress and relationship functioning. As presented in Table 3, Model 7 tested whether positive emotions at the previous time point predicted OQ symptom distress, controlling for positive emotions at the time point two prior, OQ symptom distress at the time point two prior and days since intake. In Model 8, negative emotions at the previous time point predicted OQ symptom distress, controlling for negative emotions at the time point two prior, OQ symptom distress at the time point two prior and days since intake. Next, in Model 9, changes in both positive and negative emotions were then tested within the same prospective model to examine whether they accounted for the same or independent variance in change in OQ symptom distress across the two time point lag:

#### Level 1: Time point

$$\begin{aligned} \text{OQSymptomDistress}_{ij} = & \pi_{0i} + \pi_{1i}(\text{PositiveEmotion\_Lag})_{ij} \\ & + \pi_{2i}(\text{NegativeEmotion\_Lag})_{ij} \\ & + \pi_{3i}(\text{PositiveEmotion\_2Lags})_{ij} \\ & + \pi_{4i}(\text{NegativeEmotion\_2Lags})_{ij} \\ & + \pi_{5i}(\text{OQSymptomDistress\_2Lags})_{ij} \\ & + \pi_{6i}(\text{OQTimeSinceIntake})_{ij} + e_{ij}. \end{aligned}$$

#### Level 2: Individual

$$\pi_{0i} = b_{00} + u_{0i},$$

$$\pi_{1i} = b_{10},$$

$$\pi_{2i} = b_{20},$$

$$\pi_{3i} = b_{30},$$

$$\pi_{4i} = b_{40},$$

$$\pi_{5i} = b_{50},$$

$$\pi_{6i} = b_{60}.$$

In Model 7, the significant and negative coefficient reported in the second row indicates that an increase in positive emotions from one time point to the next was a significant predictor of reduction in symptom distress assessed from the same starting point to two time points down the line. In Model 8, change in negative emotions also significantly predicted prospective change in symptom distress (Row 4). In Model 9, in contrast to the concurrent change model (see Table 2, Model 3, Row 4), change in negative emotions (Table 3, Model 9, Row 4) did not predict prospective change in symptom distress when positive emotions were included in the same model. However, as seen by the significant and negative coefficient in Row 2, an increase in positive emotions did.

### 3.2.4 | Prospective change: Relationship functioning

Models 10–12 are identical to the first three prospective change models (7, 8 and 9) except the outcome for each is the OQ interpersonal relations subscale, and they control for this subscale at the time point two prior. As the coefficients in Row 2 of Models 10 and 12 demonstrate, change in positive emotions (from two prior time points to the previous time point) significantly predicted improvements in relationship functioning from the same starting point to two time points down the line. In contrast to Models 8 and 9, change in negative emotions from two prior time points to the previous time point did not significantly predict prospective improvements in relationship functioning whether or not positive emotions was included in the model (Models 11 and 12, Row 4).



## 4 | DISCUSSION

This naturalistic study of emotion contributes to research on the critical role positive emotions play during psychotherapy and may encourage the development of interventions focusing on increasing positive emotions. As expected, positive emotions increased over treatment, while negative emotions, symptom distress and impairment in relationship functioning declined. Positive and negative emotions were correlated, as were changes in positive and negative emotions. However, despite this association, increases in positive emotions were a significant predictor of improvements in two of the primary targets of clinical interventions, symptom distress and relationship functioning, even when decreases in negative emotions were included in the same model. Additionally, positive emotions not only predicted change in these treatment outcomes over the same time period, but they also predicted future change.

Closer inspection of the expected correlation between the occurrence of positive emotions and negative emotions revealed that negative emotions at a previous time point were a significant predictor of positive emotions at the current time point whereas the inverse association—positive emotions at the previous time point predicting negative emotions at the current time point—was not significant. These findings align with Oren-Yagoda et al.' (2018) findings that changes in negative affect were a stronger predictor of subsequent changes in positive affect than the reverse. One possibility is that this association reflects current treatments' targeting of negative emotions.

### 4.1 | Symptom distress

Both increases in positive emotions and decreases in negative emotions predicted improvement in symptom distress when changes were examined during the same time period. Each accounted for unique variability in symptom distress change. At five-session intervals, as clients reported feeling less distressed about symptomology such as feeling hopeless, having heart pounding and having difficulty concentrating, they also reported more frequent experiences of positive emotions such as contentment and gratitude, and fewer experiences of negative emotions such as sadness and embarrassment. These concurrent change findings suggest that changes in both positive and negative emotions are indicators that therapeutic change is occurring. A myopic focus on negative emotions overlooks the therapeutic improvement associated uniquely with increases in feelings such as joy, gratitude, interest, love and awe. These findings add kindling to the field's growing interest in positive emotion focused interventions such as positive affect treatment (Craske et al., 2019), positive activity intervention (Taylor, Lyubomirsky, et al., 2017) and positive cognitive behavioural therapy (Geschwind et al., 2019, 2020).

Furthermore, this study provides evidence for increases in positive emotions also being precursors to therapeutic change. Change in positive emotions was the only significant predictor of prospective

change in symptom distress when in the same model as a change in negative emotions. These prospective change findings suggest that while changes in both positive and negative emotions may be indicators of therapeutic change, an increase in positive emotions is also a precursor to therapeutic change. These results dovetail with Oren-Yagoda et al.'s (2018) finding that positive affect at pretreatment predicted depressive symptoms above and beyond pretreatment negative affect and the positive-negative affect interaction. Our study differs in that we examined earlier change in positive emotion, rather than a positive emotion deficit at intake, as a predictor of therapeutic outcomes. Assessing positive emotions, independently from negative emotions, may offer therapists early insight into how their clients are progressing in therapy. Though this correlational study cannot determine causation, the timing of change of positive emotion predicting future reduction in symptom distress suggests that experiences of positive emotions may even be generators of change (Fitzpatrick & Stalikas, 2008). Building assessment of positive emotions into treatment protocols can help to advance therapists' understanding of changes that their clients are experiencing that may contribute to reduced symptomology and help with early detection of treatment efficacy.

It is important to note that there is overlap between the items on the negative emotions subscale of the mDES (Fredrickson et al., 2003) and the symptom distress subscale of the OQ 45.2 (Lambert et al., 1996). For example, the mDES includes items such as 'angry/irritated/annoyed' and 'scared/fearful/afraid' which closely resemble the OQ symptom distress items 'I feel irritated' and 'I feel fearful'. The similarity in some of the items on the two scales increases the likelihood that there would be an association in changes on these measures, and, therefore, the similarity makes the model a more conservative test of positive emotions as a unique predictor.

### 4.2 | Relationship functioning

In line with the symptom distress findings, changes in both positive and negative emotions independently predicted change in relationship functioning over the same time period. At the same time as clients experienced more positive emotions and fewer negative emotions, they also reported improvements in their relationship functioning such as feeling less concerned about family troubles and getting along well with others. These concurrent change findings suggest that changes in positive and negative emotions are independent indicators of improvement in relationship functioning.

In terms of prospective change, change in positive emotions was the only significant predictor of future change in relationship functioning. In contrast to the symptom distress findings, change in negative emotions did not predict future change in relationship functioning even when it was alone in the model. Positive emotions may therefore be particularly important to assess when wanting to understand progress in clients' ability to connect well with close others. These findings align with the broaden-and-build theory of positive emotions (Fredrickson, 2001; Fredrickson & Joiner, 2018) which posits that

experiences of positive emotions lead to openness and the gathering of resources, especially social connections. They also align with Taylor, Pearlstein, et al. (2017) findings that change in positive affect was the most robust predictor of future increases in connectedness. In a transdiagnostic intervention for anxiety and depression, similar associations between increases in positive emotion and increases in social connectedness were also found (Taylor et al., 2020). The observed pattern in these findings across studies suggests a robustness to the association between positive emotions and relationship functioning. More frequent experiences of positive emotions may encourage a willingness to engage with others and strengthen relationships. It may be particularly important for therapists focusing on relationship functioning to monitor changes in positive emotions. These findings also suggest that positive emotions may be a key target of intervention for clients struggling with their interpersonal connections.

### 4.3 | Limitations and future directions

This naturalistic study examining the trajectories of positive and negative emotions over the course of therapy in a training clinic provides valuable insight into the emotional experience of clients in community-type treatment. The structure of this correlational study though precludes us from making causal inferences about whether changes in positive emotion lead to therapeutic change or whether therapeutic change makes room for the experience of more frequent positive emotions. The transdiagnostic approach and minimal exclusion criteria allowed for an accurate portrayal of the range of clients seen in a psychology training clinic. However, the time course of change in emotional experience as well as in therapeutic change may differ by the chronicity of clients' symptoms. Clients suffering from more episodic conditions such as a depressive episode may experience earlier improvements in symptom distress and may suffer from less relationship impairment. Clients suffering from more chronic conditions such as personality disorders or persistent depressive disorder may not experience significant changes in their emotions, symptom distress or relationship functioning within the first 20 sessions of therapy. Including such a wide range of diagnoses in this study likely made some associations more difficult to detect. Future studies on these associations would benefit from more frequent time points and additional measures to test for mechanisms of change such as openness to experience.

The number of participants is a notable limitation of this study. The sample was constrained by the flow of patients through the training clinic and the abrupt termination of in-person services because of the pandemic. The repeated measure design increased the total number of observations with each participant providing between two and five emotion and outcome measures. However, the novel patterns observed here should be tested in additional samples to ensure generalizability. Another limitation to note is that, given the small sample size, not all results may survive a correction for multiple comparisons in Aim 2. However, though 12 models are reported, only four models

(Models 3, 6, 9 and 12) test the main hypotheses reducing the degree of the correction needed. The other eight models build up to the final four.

Because this study did not involve manualized treatment or limit participation based on therapeutic orientation, the impact of particular interventions known to enhance positive emotions on changes in emotional experience and on therapeutic change was not able to be assessed. More research is needed to understand the specific effects that different interventions have on increases in positive emotions and how those increases are then associated with therapeutic change. Furthermore, without a control group, we cannot know the extent to which the changes in—and associations among—emotions, symptoms and relationships observed in our study are specifically linked to treatment.

Despite these limitations, this study, to our knowledge, is the first to monitor changes in both the positive and negative emotional experiences of clients engaging in treatment in the naturalistic setting of a training clinic. The findings here highlight the value of assessing positive emotions independently of negative emotions in therapy and suggest that clinical psychology's developing interest in positive emotions is a productive new direction.

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### CONFLICT OF INTEREST

The authors declare no conflict of interest.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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