



Psychological Needs and Psychopathology in Adults Following a Significant Life Event: A Self-Determination Theory Perspective

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Abstract

Background Symptom-based diagnostic formulations significantly influence psychological treatment; however, they are not without limitations. Employing a transdiagnostic approach may address these shortcomings. For transdiagnosis to gain wider acceptance, it is crucial to establish a meaningful connection between transdiagnostic measures and symptom expression. Two potential transdiagnostic measures, the Event Characteristics Questionnaire (ECQ) and the Basic Psychological Needs Satisfaction and Needs Frustration Scale (BPNSNFS), were identified based on theories of psychopathology. The present study investigated whether the unique within-person characteristics assessed by each scale could indicate symptom expression over time.

Method Online questionnaires were completed by 290 international participants (86% female) who had experienced a significant event within the past 12 months. The measures included the ECQ, BPNSNFS, and clinical assessments of depression, anxiety, and anger.

Results Results indicated that only the BPNSNFS demonstrated a meaningful connection with symptom expression. A cross-lagged structural analysis revealed that participants experiencing higher levels of needs frustration reported higher levels of depression and anger. Conversely, those reporting higher levels of needs satisfaction reported lower levels of depression and anxiety.

Conclusions The findings suggest that the BPNSNFS can serve as a valuable transdiagnostic tool to enhance the delivery of measure-based care. Further research should continue to explore the clinical role of basic psychological needs.

Keywords Psychological assessment · Formulation · Psychological needs · Self-determination theory · Transdiagnostic · Measurement-based care

Significant life events (SLEs) are defined by their personal importance and long-term impact on wellbeing (Cohen et al., 2019; Holmes & Rahe, 1967). For example, in response to the internationally significant SARS-CoV-2 (Covid-19) pandemic, Nochaiwong et al. (2021) found that global depressive symptoms increased from 4.4% in 2015 to 28.0% and that anxiety increased from 3.6 to 26.9%, with up to 50% of individuals experiencing stress. Studies of SLEs date back to 1967, when psychiatrists Holmes and Rahe reviewed over 5000 patient records and found that SLEs increased

the likelihood of developing mental health conditions (Holmes & Rahe, 1967; Noone, 2017). SLEs are one of the most decisive risk factors for depression among community samples (Kendler et al., 2000) and have been linked to generalised anxiety (Bandelow et al., 2013) and anger (Wang et al., 2005). Thus, clinicians typically agree that events such as job loss, financial hardship, or the death of a loved one may negatively impact an individual's psychological, physical, and social functioning.

The widespread acceptance of this belief is evident in the incorporation of SLEs into clinical formulations (e.g., the 5 Ps; Cox, 2021). However, it is also well established that SLEs may not result in psychopathology even if multiple traumas and stresses are present (Anda et al., 2006; Cohen et al., 2019; Kessler et al., 2017), suggesting that underlying psychological processes influence symptom expression. Deciphering an individual's psychological processes falls to

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health professionals who create formulations through frameworks of explanatory models. Examples include the Self-determination Theory (SDT: Ryan & Deci, 2000), the transactional model of stress and coping (Lazarus & Folkman, 1987; Siah et al., 2022), the cognitive model (Beck, 1963; Clark, 2022; Mikrut et al., 2022), and the diathesis-stress model (Engel, 1977; Li et al., 2022). The basic premise of all models suggests that symptom expression arises from an interaction between a SLE and an individual's unique cognitive experience or underlying vulnerability. For example, SDT posits that the frustration of core psychological needs can expose vulnerabilities and promote psychopathology (Chen et al., 2014). Meta-analyses have documented the robust relationship between core needs and general psychological well-being (e.g., Ng et al., 2012; Slemp et al., 2018; Van den Broeck et al., 2016; Yu et al., 2018). Conversely, Beck's cognitive model emphasizes the interconnectedness of thoughts, emotions, and behaviours in the development and maintenance of psychological disorders, including depression and anxiety (Beshai et al., 2016). According to Beck's model, cognitive distortions and negative thinking patterns play a crucial role in the manifestation and perpetuation of psychopathology, individuals with depression tend to have negative automatic thoughts and cognitive biases that contribute to their depressive symptoms. Similarly, anxiety disorders are believed to stem from distorted thinking patterns and excessive worry (Clark & Beck, 2010).

Both perspectives contribute valuable insights into understanding mental health issues, shedding light on the multifaceted nature of psychopathology. However, Beck's cognitive model has significantly influenced symptom-based diagnostic approaches, such as the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and the International Statistical Classification of Diseases (ICD-11) and Related Health Problems (American Psychological Association, 2013; World Health Organization, 2019). By first recognising the influence of cognitive factors, these diagnostic manuals incorporated Beck's model to enhance the validity and reliability of the diagnostic process. While the symptom-based approach has been instrumental in standardising diagnoses, it does not fully align with the principles of SDT. Consequently, the symptom-based approach does not accommodate the holistic perspective of SDT, which recognises the influence of cultural, social, and personal factors on individuals' well-being.

Additionally, although symptom-based frameworks are embedded in clinical practice, research indicates they suffer from several shortcomings, such as insufficient reliability, comorbidity, and significant heterogeneity within diagnoses (Dalgleish et al., 2020; Ruggero et al., 2019; Tanzilli et al., 2021; Wilshire et al., 2021). Moreover, formulations that guide treatments based on identified symptoms seem prone to relapse. For example, relapse rates for anxiety are

typically between 24 and 41% (Ali et al., 2017; Penninx et al., 2011; Taylor et al., 2015) and between 27 and 77% for depression (Ali et al., 2017; Conradi et al., 2017; Hardeveld et al., 2013; Wojnarowski et al., 2019). Whereas therapies that go beyond Beck's cognitive model have been shown to yield better outcomes for individuals, with a growing consensus of researchers emphasising the need for measures identifying underlying causal mechanisms in addition to presenting symptomatology (Ali et al., 2017; Astle et al., 2022; Bakker, 2019; Dalgleish et al., 2020; Fusar-Poli et al., 2019; Probst, 2015; Ruggero et al., 2019; Schaeuffele et al., 2021). Compelling evidence supporting a more holistic approach can be observed in the efficacy therapies such as Acceptance and Commitment Therapy (Hayes et al., 1999), Schema Therapy (Young et al., 2003), and Interpersonal Therapy (Klerman & Weissman, 1994). These therapies, along with others, often incorporate individual differences in relationships, values, or needs and have demonstrated effectiveness in various areas, including working with clients displaying resistance to symptom-based therapies (Bai et al., 2020; Mozamzadeh et al., 2018), reducing relapse rates (Bahram Abadian et al., 2021; Bernstein et al., 2021; Oraki, 2019), and yielding long-term benefits (Bai et al., 2020; de Mello et al., 2005; Lemmens et al., 2020; Markowitz, 2021; Masley et al., 2012).

One interpretation of this evidence is that symptom-based approaches to clinical formulation primarily identify and treat symptom expression, which may result in symptom relapse in the presence of ongoing or renewed stress. In comparison, holistic approaches identify and treat deficiencies predisposing an individual to symptom development, increasing psychological resilience to present and future stress, see Fig. 1.

Transdiagnosis proposes that common processes or mechanisms underlie or act as maintaining factors across disorders (Harvey et al., 2004). Additionally, a transdiagnostic approach is recognised as an essential component of *measurement-based care* (Scott & Lewis, 2015), defined as the systematic assessment of patient presentation and effectiveness of treatment (Waldrop & McGuinness, 2017). However, a diagnostic test's *clinical utility* is characterised by its association with improved health outcomes, which (as previously discussed) are typically measured through state measures of symptom expression (Smart, 2006). Therefore, to establish clinical utility in a transdiagnostic measure, it would be vital to demonstrate a significant relationship between the processes or mechanisms identified and an individual's symptom expression. Given that the global prevalence of mental health conditions is led by depression, anxiety, and antisocial disorders (World Health Organization, 2022), it seems appropriate to examine potential transdiagnostic measures with clinical measures of depression, anxiety, and, anger. Further, it is logical that an explanation

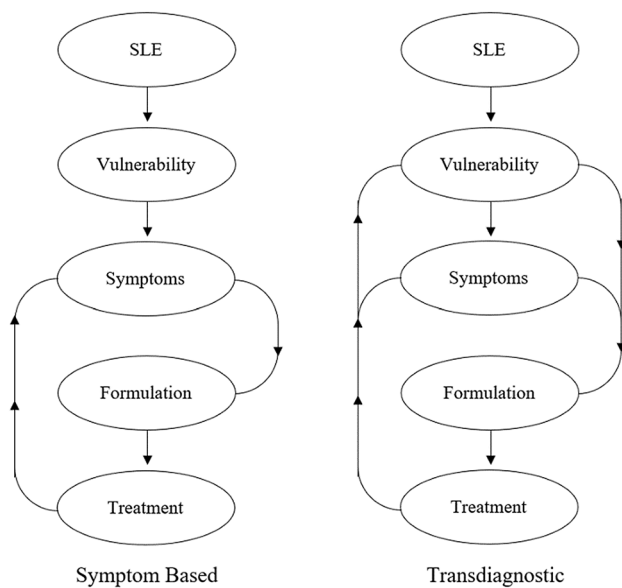


Fig. 1 Symptom based approach versus transdiagnostic approach

of the mechanisms of transdiagnosis within a given measure would align with the empirically validated models of psychopathology (i.e., the transactional model, cognitive model, and diathesis model).

The transactional model of stress and coping (Lazarus & Folkman, 1987) proposes that challenges and threats arise from cognitive judgments of the meaning of a situation and one's ability to respond to it. Primary appraisal refers to determining whether a situation is benign or stressful. Stressful situations require specific actions from the individual to facilitate a positive outcome; thus, it is essential to differentiate between challenging and threatening stress situations. Similarly, Beck's cognitive theory (Beck, 1963) holds that our thinking influences our emotional and behavioural actions and vice versa. For example, an individual's cognitions categorise anxiety and depression; anxiety involves thoughts of physical and psychological danger, while depression involves thoughts of personal loss and failure (Beck, 1963).

Aligning with both cognitive theories, the ECQ (Luhmann et al., 2020) represents a possible transdiagnostic measure by providing a taxonomy of nine distinct characteristics of a SLE, including; valence, impact, predictability, challenge, emotional significance, worldviews, social status, external control, and extraordinariness. These individual characteristics were selected to increase an understanding of why, when, and for whom SLEs might have adverse psychological outcomes. Their longitudinal study of 235 college students (75% female, mean age 21.7 years) found that experiencing a SLE was associated with an immediate drop in life satisfaction and mood. Furthermore, they concluded that the ECQ predicted individual differences in

subjective wellbeing over and above established predictors like personality and demographics (Luhmann et al., 2020). However, outcome measures were limited to assessing subjective general wellbeing, such as the first three items of the Satisfaction with Life Scale (Diener et al., 1985) and mood with the six-item Scale of Positive and Negative Experience (Diener et al., 2010).

Alternatively, the diathesis-stress model (Engel, 1977) proposes that a stressful life event can increase the likelihood of individuals developing psychopathology because of their *diathesis* or vulnerable disposition to stress; a diathesis may be a biological factor, such as abnormal variations in one or more genes. However, factors not genetically hardwired can also be diatheses if they develop early in life and persist over time (Cox et al., 2020; Spruijt et al., 2019).

Aligning with the vulnerability approach, SDT suggests a possible transdiagnostic ability by asserting that the frustration of core needs may reveal individual vulnerabilities and promote psychopathology, while need satisfaction fosters psychological resilience (Vansteenkiste & Ryan, 2013). The needs are assessed via the BPNSNFS (Deci & Ryan, 2008; Ryan & Deci, 2000), which qualifies the needs as: autonomy, defined as an individual being independent and actively involved in one's life; relatedness, defined as an individual's feeling of belonging, respect, and being valued by family and friends; and competence, defined as an individual's feeling of efficiency, effectiveness, and efficacy in one's life (Deci & Ryan, 2008). However, like the ECQ, the measurements of wellbeing within core needs studies has typically only assessed general mental health, such as positive and negative affect or quality of life (Ng et al., 2012; Slep et al., 2018; Van den Broeck et al., 2016; Yu et al., 2018).

The Rationale for the Present Study

Symptoms are the catalyst for treatment; they are meaningful and accessible and have resulted in symptom-based diagnostic frameworks (DSM-5, ICD-11). Yet, these frameworks often fail to capture the common processes or mechanisms that underlie symptom expression and are vulnerable to relapse (Ali et al., 2017; Astle et al., 2022; Bakker, 2019; Dalgleish et al., 2020; Fusar-Poli et al., 2019; Probst, 2015; Ruggero et al., 2019; Schaeuffele et al., 2021). In response, new therapies have demonstrated that a more transdiagnostic approach improves patient outcomes (Bai et al., 2020; de Mello et al., 2005; Lemmens et al., 2020; Markowitz, 2021; Masley et al., 2012). Expanding transdiagnosis requires clinical utility; a meaningful relationship with common psychopathology (Scott & Lewis, 2015; Smart, 2006; Waldrop & McGuinness, 2017). The present study identified two potential measures through a framework of explanatory theories of psychopathology. The ECQ aligned with

the transactional and cognitive models (Beck, 1963; Lazarus & Folkman, 1987), and the BPNSNFS with the individual vulnerability approach set out in SDT (Ryan & Deci, 2000), and the diathesis model (Engel, 1977). Each scale had unique transdiagnostic qualities and empirical evidence of a significant relationship limited to general wellbeing (Luhmann et al., 2020; Ng et al., 2012; Van den Broeck et al., 2016). This study aimed to address a gap in the literature by investigating the relationship between specific personal characteristics and clinical symptom expression over time when triggered by a SLE. It sought to answer the question: Do the unique characteristics assessed by each scale relate to how clinical symptoms manifest within an individual after experiencing a SLE? The study adopted a within-subjects cross-lagged nested model comparison and path analysis to compare reciprocal relationships and directional influences between variables over time, see Fig. 2. The comparison components were the ECQ (Luhmann et al., 2020), the BPN-SNFS (Chen et al., 2014), and three clinical measures of psychopathology: the Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001); the Generalised Anxiety Disorder measure (GAD-7; Spitzer et al., 2006); and the Dimensions of Anger Reactions-Revised (DAR-R; Kannis-Dymand et al., 2019; Novaco, 1975).

Congruent with the research question, we hypothesised but did not pre-register specific evaluations for the measures. (H_1) Individuals with more negative cognitive experiences measured by the ECQ at time one would report higher depression, anxiety, and anger scores at time two. (H_2) Individuals with more significant needs frustration or less needs satisfaction measured by the BPNSNFS at time one would report higher depression, anxiety, and anger scores at time two.

Methods

Participants

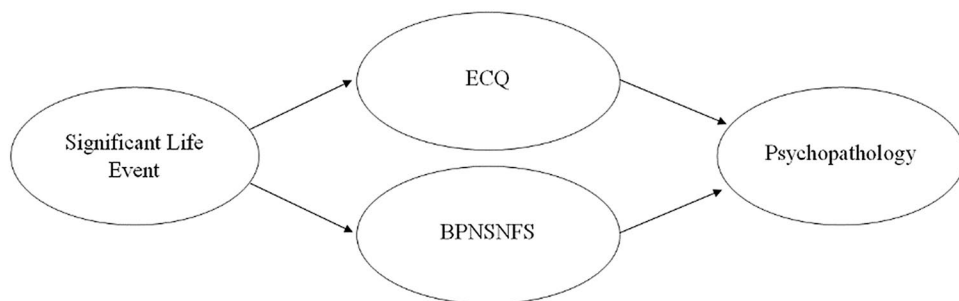
A University Human Research Ethics Committee granted ethical approval. The sample size was recommended as a ratio of 20 cases per parameter (Kline,

2015). Approximately 220 participants were sought at each time point. Participation in the study was limited to adults ≥ 18 years who have experienced at least one significant life event in the past 12 months. A significant life event was defined as “events that are of personal importance and often have a long-term impact that creates change in someone’s life. For example, marriage, divorce, job loss, relationship loss”. Participants were recruited through a snowball approach using social media. The final sample ($N=290$) comprised 86% female participants ($n=251$). Ages ranged from 18 to 83 years ($M=56.7$, $SD=13.97$). Most participants were employed in paid work (42%) and reported experiencing two SLEs in the previous 12 months (39%). Demographic information is presented in Table 1.

Table 1 Summary of demographic variables

Variable	Frequency	Percent
Employment status		
Employed in paid work	125	43.1
Volunteering	15	5.2
Unemployed	15	5.2
Unpaid parent or carer	15	5.2
Retired/other	104	36.0
Student	16	5.4
Significant life events		
One	88	30.3
Two	113	39.0
Three or more	89	30.7
Country		
Australia	85	29.3
UK	92	31.7
New Zealand	32	11.2
USA	39	13.4
Canada	40	13.8
Other	2	0.01

Fig. 2 Conceptual comparison



Design

The study used a longitudinal survey design, measuring an individual’s agreement with the measures and symptoms of depression, anxiety, and anger at two points, 28 days apart. Assessment of reciprocal relationships and directional influences between the variables over time was achieved via a nested cross-lagged model comparison as suggested by de Jonge et al. (2001), see Fig. 3. Adopting this method allows for competing models to be fitted to the data in several steps: (a) temporal stability; (b) cross-lagged structural paths of causality; (c) cross-lagged structural paths of reverse causality; (d) and cross-lagged structural paths representing reciprocal effects.

Measures

All scales demonstrated good psychometric properties for use with the general population. Cronbach’s alphas from the present study are presented in Table 7 (see “Appendix”).

The Event Characteristics Questionnaire (ECQ)

Participants rated the characteristics of the SLE using the 38-item, nine-scale ECQ (Luhmann et al., 2020). The items were rated on a 5-point Likert scale from (1) strongly disagree to (5) strongly agree. Possible scores ranged from 1 to 5, with higher scores representing a more robust perception of the factor. Sample (challenge scale) items included ‘The event scared me.’ The ECQ provides a taxonomy of nine distinct characteristics of a SLE, which may improve the prediction of people’s emotional reactions. The creators of the scale report acceptable internal consistency in each of the nine factors ranging from Cronbach’s $\alpha = 0.68$ to 0.94 (Luhmann et al., 2020).

The Basic Psychological Needs Satisfaction Needs Frustration Scale (BPNSNFS)

Participants’ perception of basic needs, frustration or satisfaction, was measured using the 24-item BPNSNFS (adult version; Chen et al., 2014). The items were rated on a 5-point Likert scale, ranging between (1) not at all true to (5) completely true. Possible scores on the final sub-scales (frustration and satisfaction) ranged from 12 to 60, with higher scores representing a more robust perception of the factor. Sample (autonomy satisfaction scale) items included ‘I feel a sense of choice and freedom in the things I undertake.’ The BPNSNFS scale is widely used to measure an individual’s basic psychological needs and can be applied as a single scale or as separate subscales (Haerens et al., 2015; Kindt et al., 2016). The BPNSNFS has demonstrated reliability and validity with internal consistency calculated for each subscale ranging from Cronbach’s $\alpha = 0.71$ to 0.89 (Chen et al., 2014).

Patient Health Questionnaire (PHQ-9)

Participants’ depression was measured using the 9-item PHQ-9 (Kroenke et al., 2001). The items were rated on a 4-point Likert scale (0) not at all, (1) several days, (2) more than half the days, and (3) nearly every day. Possible scores range from 0 to 27. Scores ≤ 4 suggest minimal depression, 5–9 suggest mild depression, 10–14 suggest moderate depression, 15–19 suggest moderate-severe depression, and 20–27 suggest severe depression. Sample item: ‘Little interest or pleasure in doing things.’ The PHQ-9 is a widely used self-report measure of depressive symptom severity and is recommended by the DSM-5 to indicate symptom severity for major depressive disorder. In addition, the PHQ-9 has demonstrated validity and excellent internal reliability with Cronbach’s $\alpha = 0.89$ (Kroenke et al., 2001).

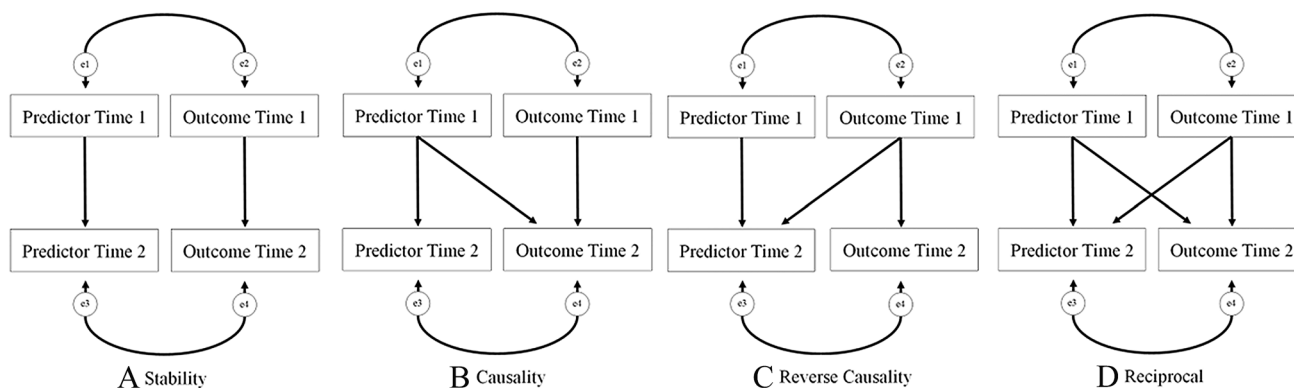


Fig. 3 Nested model comparison

Generalised Anxiety Disorder Screener (GAD-7)

Anxiety was measured using the 7-item GAD-7 scale (Spitzer et al., 2006). Items were scored on a 4-point Likert scale (0) not at all sure, (1) several days, (2) over half of the days, and (3) nearly every day. Possible scores ranged from 0 to 21. Scores > 5 suggest mild anxiety, > 10 moderate anxiety, and > 15 severe anxieties. Sample Item: ‘Feeling nervous, anxious, or on edge.’ The GAD-7 measured the presence and severity of anxiety and was selected based on psychometric properties, understandability, and brevity. Studies have found that the GAD-7 is valid and has excellent internal reliability, as demonstrated by Cronbach’s α of 0.92 (Spitzer et al., 2006).

Dimensions of Anger Reactions-Revised (DAR-R)

Anger was measured using the seven-item DAR-R (Kannis-Dymand et al., 2019; Novaco, 1975). Items were scored on a 5-point Likert scale (0) not at all, (1) a little, (2) moderately so, (3) fairly much, and (4) very much. Possible scores ranged from 0 to 28, with higher scores indicating a higher level of anger. Scores > 20 suggest an individual may be prone to interpersonal problems and adverse physical or psychological conditions. Sample Item: ‘When I get angry, I stay angry.’ The DAR-R is a brief questionnaire used in various settings, including mental health, primary health care, and research, to identify clinically problematic anger. A Cronbach’s α value of 0.85 demonstrates the validity and excellent internal reliability of the DAR-R (Kannis-Dymand et al., 2019).

Procedure

Survey one was available to be completed between November 2021 and June 2022. Twenty-eight days after completing the first survey, an automated email invited participants to complete survey two. Participants responded to a Facebook advertisement that included a link to the online questionnaire via Qualtrics (<https://www.qualtrics.com/au/>). Participants were informed that the study aimed to examine how life stressors result in depression, anxiety, and anger outcomes. Prior to commencement, informed consent was actively obtained via tick-box. Participants provided demographic information and responded to questions on five scales, which took 20 min to complete on average.

Statistical Analyses

According to Kline (2011), “A parcel is a total score across a set of homogeneous items each with a Likert-type scale”, and “Parcels are generally treated as continuous variables” (p. 179). Following these recommendations, parcels

were created by calculating the mean scores and averaging responses across items for the ECQ or by combining scores for responses across items for the BPNSNFS, PHQ-9, GAD-7, and DAR-R (Carifio & Perla, 2008; Norman, 2010). Results were considered significant at $p < 0.05$. Two cross-lagged structural models were constructed to examine the relationships between psychological needs, depression, anxiety, and anger over time. The Statistical Package for the Social Sciences (SPSS Version 28.0; IBM Corp, 2021) was used for all statistical analyses; structural equation modelling was conducted using IBM; Amos 28.0 in SPSS. Model fit was regarded as acceptable if: the Normed Fit Index (NFI) ≥ 0.90 (Byrne, 1994), or 0.95 (Schumacker & Lomax, 2004); the Tucker Lewis index (TFI) ≥ 0.90 (Hoyle, 1995); the Comparative Fit Index (CFI) ≥ 0.93 (Byrne, 1994); RMSEA ≤ 0.08 (Browne & Cudeck, 1992) and ideally ≤ 0.05 (Steiger, 1990); the relative chi-square (χ^2/df) is ≤ 2 (Kline, 2011; Tabachnick et al., 2007). AIC is a fit measure relative to the value of the saturated model; a good fit occurs when the AIC is less than the saturated model (Burnham & Anderson, 1998).

Results

Preliminary Analysis

According to psychological literature, a significant life event is intricately tied to an individual’s subjective or phenomenological experience, which influences their unique interpretation, emotional response, and personal meaning-making processes (Grob, 1995; Headey & Wearing, 1989; Holmes & Rahe, 1967). A word frequency query of the participants’ description of their SLEs revealed the most frequent SLE’s as covid, lockdown, work changes, and job loss, which was congruent with the stated definition of an SLE.

The 290 participants that met the inclusion criteria indicated their level of agreement with the ECQ, BPNSNFS, PHQ-9, GAD-7, and the DAR-R on two occasions 28 days apart. A correlation matrix analysis was conducted to find out how they related. Being older significantly correlated with reduced need frustration, depression, anxiety, and anger at both times. Mean scores, standard deviations, and zero-order correlations of the ECQ scale from time one is presented in Table 5 and the BPNSNFS in Table 6 (see “Appendix”). Based on the mean responses to the PHQ-9, GAD-7, and DAR-R, participants were mildly depressed and mildly anxious but not angry, and the mean depression, anxiety, and anger scores were reduced at time two. Overall, the BPNSNFS had higher and more consistent (i.e., all were significant) correlations with outcome measures compared to the ECQ. Of the nine ECQ scales, seven positively correlated with outcome measures, and two (Predictability

and Valence) were negatively correlated. Two superordinate scales were constructed and named the ECQ positive (7 scales) and ECQ negative (2 scales). Additionally, the individual needs scales (relatedness, autonomy, competence) were combined to create BPNSNFS total need frustration and satisfaction scales to facilitate a comprehensive comparison, as shown in Table 7 (see “Appendix”). Again, the BPN-SNFS scales had more robust significant correlations with outcome measures compared to the constructed ECQ scales. Considering the requirement for clinical utility, defined by a meaningful relationship between the measure and clinical symptom expression, it was deemed more appropriate to use the BPNSNFS scales for structural analysis.

Assumptions

At time one, 1531 respondents attempted the questionnaire. Thirty-three participants were removed for failing two embedded attention checks, and 802 were removed via list-wise deletion of participants without complete data sets, leaving a sample size of 696, of which 570 (82%) had experienced at least one significant life event in the previous 12 months. At time two, there were 555 respondents. Seven participants were removed for failing embedded attention checks and 164 for missing data leaving a sample size of 384. Missing data were evaluated and considered *missing completely at random*, likely not to produce a sample bias (Kang, 2013). When merged, the number of respondents who completed both questionnaires was 360, or 51.7% of the initial time one group. This percentage is not unusual according to the literature on longitudinal non-response (Hagenaars, 1990). A further 62 participants that had not experienced a SLE at time one was removed, as this was considered incongruent with the research design. An analysis of standardised values of all variables revealed six univariate outliers that fell outside the cut-off (Maximum, $Z > 3.29$, Minimum, $Z < -3.29$), which were removed. Multivariate outliers were assessed via Mahalanobis distance and interpreted via a χ^2 distribution, with degrees of freedom equivalent to the number of independent variables in the regression (Tabachnick et al., 2007). Two multivariate outliers were removed due to a violation of the structural models’

critical χ^2 value ($\alpha = 0.001$). Collinearity was assessed, and variables fell within the recommended acceptable cut-off ($VIF < 0.5$; Hair et al., 2019). Considering the final sample ($N = 290$) in the context of the central limit theory (Wilcox, 2010), the assumptions of normality for means-testing and sample size for structural equation modelling were met (Field, 2018; Kline, 2011).

Main Analysis

Group Differences

Independent t-tests revealed no significant effect of biological sex on psychological needs, depression, anxiety, or anger. A one-way between-subjects ANOVA was conducted to compare the effect of employment status on basic psychological needs, depression, anxiety, and anger at time one; Post hoc comparison results using the Tukey test are presented in Table 2. Post hoc comparisons consistently indicated that there might be a diathesis effect in participants with lower levels of needs satisfaction. For example, significant results indicated that the unpaid parent or carer group had lower needs satisfaction and higher depression and anxiety scores compared to employed, volunteering or retired individuals. In contrast, the volunteering group had the highest needs satisfaction and lower depression and anxiety scores. The results support the concept that a low level of needs satisfaction is analogous to psychological vulnerability, which according to the diathesis-stress model, may be activated by stress transforming into the actuality of psychopathology (Engel, 1977).

Structural Equation Modelling

In structural equation modelling, nested model comparisons test the addition or removal of parameters within otherwise identical models (Byrne, 1994). Comparing the fit of two models when one is nested within the other is straightforward since the difference between the chi-square statistics of two nested models follows the chi-square distribution with degrees of freedom equal to the difference between the degrees of freedom of the two models (Ockey & Choi,

Table 2 Means, standard deviations, and one-way analyses of variance in psychological needs depression and anxiety at Time 1

Dependent variable	$F(5,284)$	p	η^2	Employed		Unemployed		Volunteering		Unpaid parent or carer		Retired/other		Student	
				M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Needs Satisfaction	4.89	<0.001	0.08	47.57 _a	8.0	42.07	7.82	50.93 _b	8.42	38.60 _{a,b,c,d}	6.88	47.17 _c	9.17	49.06 _d	8.78
Depression	2.80	0.018	0.05	8.63	6.37	11.87	6.91	6.67 _a	7.32	13.53 _{a,b}	6.61	8.17 _b	6.59	8.00	6.57
Anxiety	5.34	<0.001	0.09	7.12 _a	5.40	9.87	4.49	4.27 _b	5.47	11.93 _{a,b,c}	5.81	5.76 _c	5.36	7.38	5.53

Group differences for needs frustration and anger were non-significant; means in a row sharing a subscript differ significantly

2015). Often, this procedure is referred to as the chi-square difference test. Tables 3 and 4 show an overview of the nested model comparisons. Among the 290 participants, 91 (31%) reported experiencing a new significant life event after completing survey one. Therefore, this newly occurring event was controlled for in all models to reduce the possibility of it acting as an extraneous variable.

According to the needs frustration nested model comparison results, the causal and reverse causal models differed significantly from the stability models. Thus, unconstrained models with lagged effects better account for the data than a model (stability) in which time is the only variable. Furthermore, the reverse and causal models differed significantly from the reciprocal models. Overall, the causal and reciprocal models showed an excellent fit. However, all reverse causal pathways within the reciprocal model were non-significant. As shown in Fig. 4, the final model was constructed by removing the non-significant pathways and following the modification indices in several steps. Except for anxiety, which was non-significant, and anger, which displayed a reciprocal effect, the model closely matched causality. The final frustration model demonstrated an excellent fit, $\chi^2/df=1.135$ ($\chi^2=14.75$, 13 *df*), $p=0.323$; CFI=0.999, NFI=0.992, TLI=0.997, RMSEA=0.022 (95% CI 0.000–0.064), AIC=78.75 (AIC saturated=90.00).

According to the needs satisfaction nested model comparison results, the causal and reciprocal models differed significantly from stability; this indicates that the unconstrained models with lagged effects are more appropriate for interpreting the data. The causal model did not differ significantly from the reciprocal model, and both models had excellent fit indices. Nevertheless, all reverse causal pathways within the reciprocal model were again non-significant. As shown in Fig. 5, the final model was constructed by removing the non-significant pathways and following the modification indices in several steps. The final model was consistent with causality, except that the causal effect of needs satisfaction on anger was not significant. In contrast to the model for need frustration, a new SLE at time two had no significant effect on needs satisfaction. The final satisfaction model demonstrated an excellent fit, $\chi^2/df=0.914$ ($\chi^2=13.71$, 15 *df*), $p=0.547$; CFI=1.00, NFI=0.992, TLI=1.00, RMSEA=0.000 (95% CI 0.000–0.051), AIC=73.71 (AIC saturated=90.00).

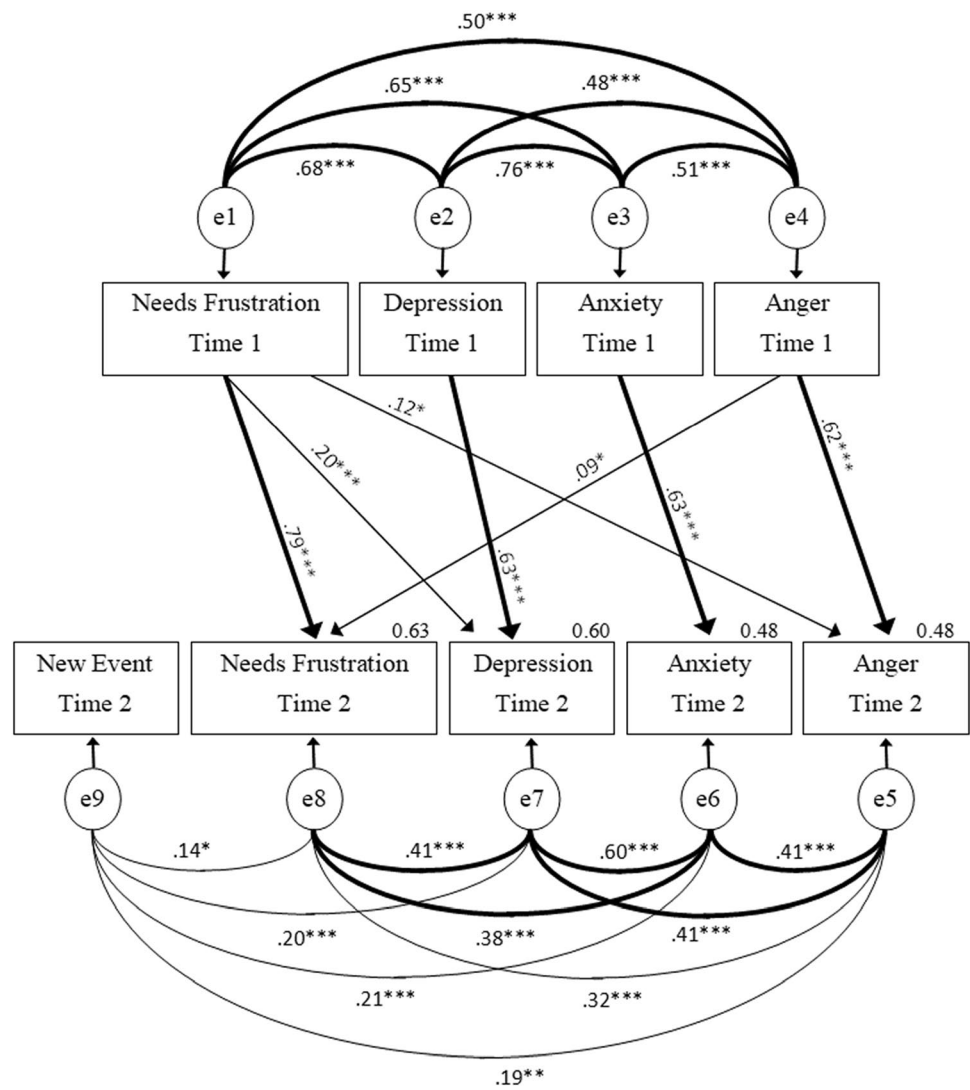
Table 3 Nested model and model fit comparisons needs frustration

Nested model comparison needs frustration	<i>df</i>	χ^2	<i>p</i>	Model fit comparison	NFI	TLI	CFI	RMSEA	χ^2/df	AIC saturated 90.00
Assuming reciprocal to be correct				Reciprocal	0.996	1.01	1.00	0.000	0.695	76.95
Causal	3	10.37	0.016	Causal	0.990	0.993	0.998	0.034	1.33	81.32
Reverse causal	3	16.73	0.001	Reverse Causal	0.987	0.983	0.994	0.053	1.82	87.68
Stability	6	30.48	0.000	Stability	0.979	0.973	0.988	0.068	2.34	95.43
Assuming stability to be correct										
Causal	3	20.11	0.000							
Reverse causality	3	13.75	0.003							

Table 4 Nested model and model fit comparisons needs satisfaction

Nested model comparison needs satisfaction	<i>df</i>	χ^2	<i>p</i>	Model fit comparison	NFI	TLI	CFI	RMSEA	χ^2/df	AIC saturated 90.00
Assuming reciprocal to be correct				Reciprocal	0.996	1.01	1.00	0.000	0.744	77.44
Causal	3	4.40	0.221	Causal	0.993	1.00	1.00	0.000	0.911	75.84
Reverse causal	3	9.73	0.021	Reverse Causal	0.990	0.993	0.998	0.033	1.32	81.17
Stability	6	15.79	0.015	Stability	0.987	0.991	0.996	0.040	1.45	81.23
Assuming stability to be correct										
Causal	3	11.39	0.010							
Reverse causality	3	6.60	0.109							

Fig. 4 Final needs frustration structural model. Beta coefficients greater than $\beta = \pm 0.3$ are presented in bold (standardised solution; $N = 290$). * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$



Discussion

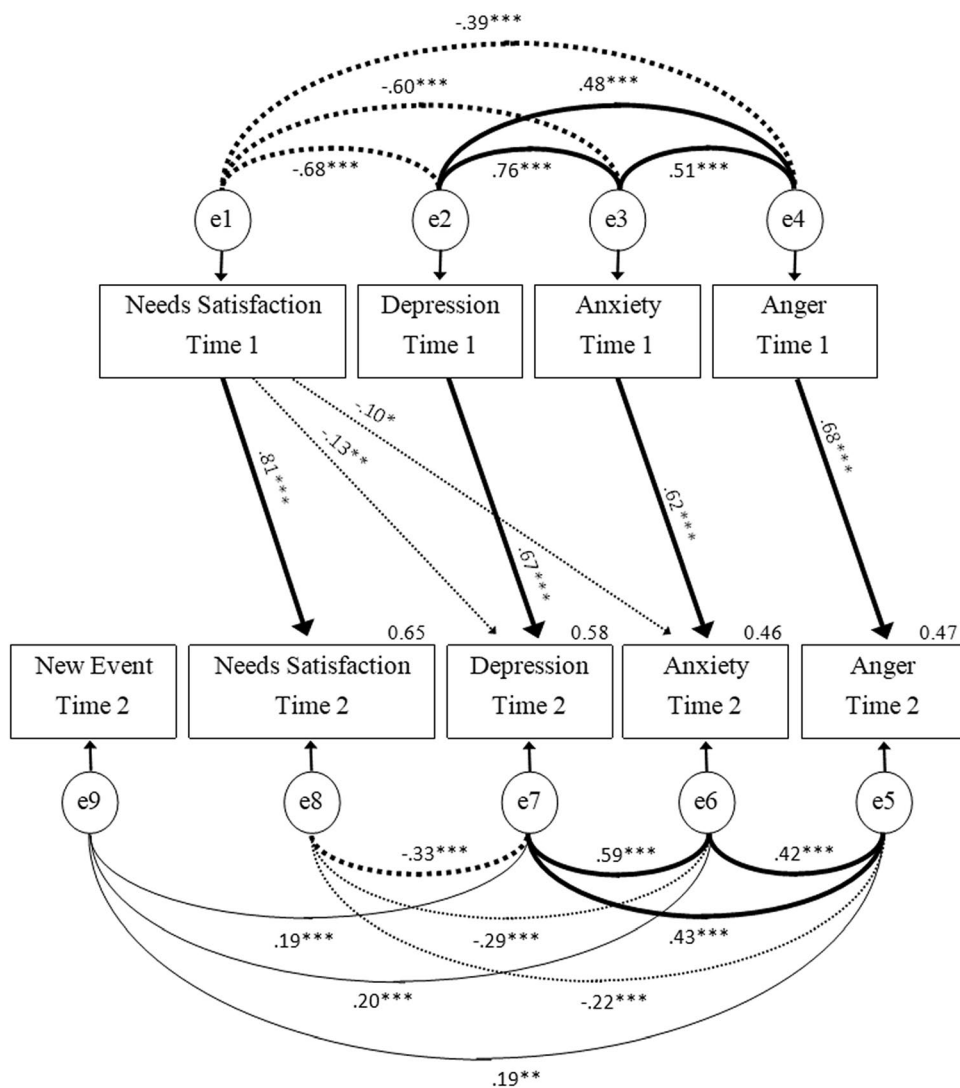
The current study aimed to compare the transdiagnostic clinical utility of two self-report measures, namely the ECQ and the BPNSNFS, with three self-report measures of clinical psychopathology, the PHQ-9, GAD-7, and DAR-R, in the context of a SLE. The study examined reciprocal relationships and directional influences between these variables over time. Correlation matrices assessed the relationships between the ECQ, BPNSNFS, and clinical measures. The results indicated that the ECQ negative subscale did not significantly associate with the clinical measures, and the ECQ positive subscale demonstrated only weak positive correlations (failing to support H_1). Comparatively, SDT’s BPNSNFS needs frustration scale demonstrated significant moderate positive correlations, and the needs satisfaction

demonstrated significant moderate negative correlations (supporting H_2) with the clinical measures. Given the clinical utility requirement, only the BPNSNFS was selected for structural modelling. The final cross-lagged analysis provided additional evidence of possible causal effects (supporting H_2), suggesting that the BPNSNFS may serve as a transdiagnostic measure with clinical utility. The findings, both correlational and structural, align with Van den Broeck et al. (2016) meta-analysis of 99 studies on SDT’s core needs research, which found that each need contributes distinctively to positive affect, general well-being, and life satisfaction while explaining about half of the variance in negative aspects of well-being.

Needs and Psychopathology

Correlation analyses revealed a transdiagnostic efficacy in the relationships between each core need and clinical symptom expression. For example, need frustration at time one

Fig. 5 Final needs satisfaction model. Beta coefficients greater than $\beta = \pm 0.3$ are presented in bold, and negative beta coefficients are presented as dashed lines (standardised solution; $N = 290$). * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$



correlated positively with depression, anxiety, and anger at time two ($r = 0.62, 0.50$, and 0.45 , respectively) and need satisfaction negatively correlated ($r = -0.60, -0.48$, and -0.33 respectively). These findings support the notion that individual core needs are separate but related elements essential for well-being (Ryan & Deci, 2000). Therefore, needs frustration may be considered as a transdiagnostic measure of common processes or mechanisms that underlie depression and anger, based on the weak but significant positive regression coefficients at time one to symptom expression at time two. The results are consistent with the SDT perspective adopted by researchers. For example, Hein et al. (2015) found that need thwarting predicted anger in students, and Costa et al. (2016) found that need frustration led to feelings of depression in adolescents. Anxiety, however, did not show the same evidence.

According to Beck (1963) cognitive theory, a person suffering from anxiety has maladaptive thoughts about physical or psychological danger. In addition, the intolerance of uncertainty model suggests that a common characteristic of anxiety is believing that unexpected events should be avoided and perceiving uncertainty about the future as unfair (Ouellet et al., 2019). It is possible that these cognitive biases did not load on the questions of everyday experiences in the BPNSNFS. As a result, while core needs were found to have an important relationship with anxiety, it may be more effective to predict anxiety by utilising measures such as the ECQ, which aligns with cognitive theories (Beck, 1963; Lazarus & Folkman, 1987). However, the moderation effect of age should also be considered.

The frustration-aggression hypothesis may provide insight into anger's reciprocal effect that was apparent in

the needs frustration model. Anger has been associated with lower life satisfaction, suicidal ideation, and aggressive behaviour (Cowlshaw et al., 2021). It is, therefore, possible that anger may contribute to frustration of needs, which, in turn, contributes to anger (Miller, 1941). This research may be helpful to clinicians in determining which treatments should be prioritised. Overall, the results support the concept that needs frustration has a transdiagnostic clinical utility.

The satisfaction model supported the indication from the analysis of group differences (ANOVA) that higher levels of needs satisfaction may increase resilience to psychopathology. Specifically, there was a weak but significant negative correlation between needs satisfaction at time one and depression and anxiety at time two. Consistent with the notion that a diathesis should persist over time (Cox et al., 2020; Spruijt et al., 2019) the needs satisfaction analysis revealed no age bias, no reciprocal effects, and satisfaction was unaffected by a new SLE at time two. Overall, needs satisfaction appears to be a distinct, stable construct that may quantify psychological resilience.

Following the SDT perspective, the satisfaction of autonomy, competence, and relatedness needs contributes to well-being by strengthening inner resources that contribute to resilience, whereas needs frustration results in health problems and increases psychopathological vulnerabilities (Vansteenkiste & Ryan, 2013). By examining needs satisfaction and frustration independently, the present study suggests the following nuances of specificity and causality. The BPN-SNFS may be related to depression, anxiety, and anger in a significant and causal manner. More precisely, needs frustration may be a measure capable of predicting depression and anger arising from a SLE, while needs satisfaction may be a measure capable of quantifying psychological resilience or individual vulnerability to developing depression and anxiety following a SLE.

Real-World Implications

A transdiagnostic approach may provide previously unknown therapeutic targets for all clinicians, regardless of their distinctive therapeutic style. Furthermore, quantifying these mechanisms might improve measurement-based care, which combines patient-reported rating scales with evidence-based guidelines to guide precise treatment and evaluate a patient's progress (Waldrop & McGuinness, 2017). Measurement-based care has been shown to enhance outcomes by accelerating improvements and quickly identifying

patients whose health would otherwise deteriorate. Yet, it is underutilised, with fewer than 20% of health professionals adopting it (Lewis et al., 2019). The 24-question basic psychological needs scale requires no specific training for use or interpretation. By administering the scale during intake, results could be adapted to basic formulation templates and post-treatment, they may quantify meaningful change, enabling health professionals to integrate measure-based care seamlessly into their practice. Additionally, this holistic approach will likely strengthen the therapeutic alliance (Del Re et al., 2012), which has been shown to mediate therapeutic outcomes in up to 70% of studies (Baier et al., 2020).

Beyond the clinical setting, the scale could assess community vulnerability to psychopathology. It is estimated that up to 10% of the population will experience a natural disaster in their lifetime (Goldstein et al., 2016). Mounting evidence suggests that such events are becoming more frequent and intense (Ebi et al., 2021). However, little is known about natural disasters' longer-term mental health impacts on vulnerable populations (Raker et al., 2019). Vulnerability assessment of mental health and developing psychological resilience are priority actions, "The risks are urgent, so action is needed now" (Ebi et al., 2021, p. 2). Assessing psychological needs at the community level may inform psychological interventions that enhance a person's sense of connectedness, autonomy, and competence increasing resilience to adversity.

Strengths, Limitations, and Future Research Directions

This study's primary strength was its comparison of theoretically informed measures and longitudinal cross-lagged design in the presence of SLE, activating and tapping into within-person fluctuations that resulted in clinical symptom expression over time. Furthermore, Missing data can be a limitation in cross-lagged statistical analysis as it may introduce bias and reduce the generalizability of the findings. Therefore, participants who failed to answer a question, did not experience a SLE, or did not complete the survey at Time 2 were deleted from the study. Additionally, the description of each SLE was checked to ensure it met the criteria stated by the definition. It is possible, however, that the study's self-reported data may be susceptible to common-method bias, reflecting a weakness of existing measures rather than a defect in the theoretical framework itself. Further considerations may include the lack of exclusion criteria, such as

a history of severe mental illness or neurological disorders (e.g., schizophrenia or dementia), individuals who have recently undergone significant psychological interventions or therapies (e.g., psychotherapy or counselling), or individuals with a history of substance abuse or dependence which may influence their psychological well-being unrelated to the significant life event.

Finally, the demographic analysis revealed that the moderating effect of age had influenced our sample. This age bias may have reduced the regression strengths within the final structural models and should be considered in the unfavorable correlation comparison of the ECQ. By varying the mean age of sample populations, replication research may better assess the strength of causal effects. There is also considerable scope for research to enhance the understanding of psychological resilience and mechanisms of post-traumatic growth.

Conclusion

The empirical evidence presented in this study aligns with previous research, demonstrating theoretical and logical consistency. It supports the notion that SDT's basic psychological needs possess specific transdiagnostic capabilities and clinical utility, indicating that two factors contribute to maintaining a delicate balance in the intricate relationship between life events and psychopathology. These factors include the impact of events on everyday life, reflected in needs frustration, and the individual's inherent level of resilience or vulnerability to such impact, reflected in needs satisfaction. Integrating SDT's BPNSNFS into routine psychological services holds the potential to enhance measurement-based care practices. This integration may lead to more effective treatment strategies and improved outcomes for individuals seeking psychological support.

Appendix

See Tables 5, 6 and 7.

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Data Availability Data are available from the corresponding author upon reasonable request.

Table 5 Means, standard deviations, zero-order correlations for ECQ scales at Time 1 with depression, anger, and anxiety

Variables	M	(SD)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Challenge Time 1	4.20	(0.87)														
2. Significance Time 1	4.45	(0.64)	0.48**													
3. External Control Time 1	3.25	(1.34)	0.07	0.08												
4. Extraordinariness Time 1	2.53	(0.91)	0.22**	0.10	0.13*											
5. Impact Time 1	4.28	(0.84)	0.45**	0.30**	0.17**	0.21**										
6. Predictability Time 1	2.41	(1.17)	-0.20**	-0.22**	-0.08	-0.24**	-0.04									
7. Social Status Time 1	2.23	(1.21)	0.30**	0.19*	0.23**	0.15**	0.42**	-0.02								
8. Valence Time 1	1.20	(1.01)	-0.34**	-0.25**	-0.04	-0.12*	-0.01	0.40**	-0.06							
9. World Views Time 1	3.62	(0.97)	0.32**	0.37**	0.14*	0.22**	0.43**	-0.20**	0.36**	-0.08						
10. Depression Time 1	8.75	(6.65)	0.31**	0.29**	0.09	-0.00	0.24**	-0.01	0.17**	-0.10	0.11					
11. Anxiety Time 1	6.89	(5.33)	0.34**	0.34**	0.05	0.04	0.26**	0.02	0.19**	-0.08	0.13*	0.76**				
12. Anger Time 1	4.72	(5.03)	0.17**	0.17**	0.12*	0.02	0.12*	-0.09	0.11	-0.09	0.07	0.48**	0.51**			
13. Depression Time 2	7.81	(6.06)	0.31**	0.28**	0.10	0.03	0.24**	-0.04	0.14*	-0.11	0.10	0.77**	0.61**	0.39**		
14. Anxiety Time 2	5.99	(5.50)	0.27**	0.28**	0.02	0.09	0.25**	0.01	0.14*	-0.05	0.13*	0.55**	0.70**	0.33**	0.71**	
15. Anger Time 2	3.93	(4.40)	0.18**	0.20**	0.09	0.05	0.12*	-0.08	0.04	-0.07	0.07	0.38**	0.43**	0.69**	0.50**	0.50**

N = 290

*p < 0.05; **p < 0.01; ***p < 0.001

Table 6 Means, standard deviations, zero-order correlations for BPNSNFS scales at Time 1 with depression, anger, and anxiety

Variables	M	(SD)	1	2	3	4	5	6	7	8	9	10	11
1. Autonomy Satisfaction Time 1	14.37	(3.62)											
2. Autonomy Frustration Time 1	12.23	(4.20)	-0.64**										
3. Relatedness Satisfaction Time 1	16.81	(3.25)	0.54**	-0.35**									
4. Relatedness Frustration Time 1	8.25	(3.91)	-0.45**	0.40**	-0.69**								
5. Competence Satisfaction Time 1	15.75	(3.60)	0.64**	-0.43**	0.49**	-0.42**							
6. Competence Frustration Time 1	10.28	(4.32)	-0.53**	0.51**	-0.43**	0.53**	-0.70**						
7. Depression Time 1	8.75	(6.65)	-0.63**	0.54**	-0.50**	0.49**	-0.56**	0.62**					
8. Anxiety Time 1	6.89	(5.33)	-0.56**	0.50**	-0.43**	0.49**	-0.52**	0.59**	0.76**				
9. Anger Time 1	4.72	(5.03)	-0.36**	0.42**	-0.36**	0.39**	-0.28**	0.41**	0.48**	0.51**			
10. Depression Time 2	7.81	(6.06)	-0.52**	0.46**	-0.45**	0.45**	-0.53**	0.59**	0.77**	0.61**	0.39**		
11. Anxiety Time 2	5.99	(5.50)	-0.43**	0.39**	-0.35**	0.36**	-0.43**	0.46**	0.55**	0.70**	0.33**	0.71**	
12. Anger Time 2	3.93	(4.40)	-0.31**	0.36**	-0.29**	0.36**	-0.23**	0.38**	0.38**	0.43**	0.70**	0.50**	0.50**

N = 290

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 7 Means, standard deviations, zero-order correlations and Cronbach's alpha for combined scales, depression, anger, and anxiety

Variables	M	(SD)	1	2	3	4	5	6	7	8	9	10	11	12
1. ECQ Negative Time 1	2.19	(0.92)	(0.86)											
2. ECQ Positive Time 1	3.50	(0.58)	-0.25**	(0.87)										
3. Total Frustration Time 1	30.76	(10.06)	-0.09	0.29**	(0.87)									
4. Total Satisfaction Time 1	46.93	(8.78)	0.09	-0.16**	(0.91)									
5. Age	56.65	(13.97)	-0.09	-0.09	0.11	(NA)								
6. Biological Sex	1.93	(0.41)	0.05	0.02	0.07	-0.11	-0.00	(NA)						
7. Events at Time 1	3.00	(0.78)	-0.07	0.21**	0.12*	-0.08	-0.09	0.08	(NA)					
8. Depression Time 1	8.75	(6.65)	-0.06	0.26**	0.68**	-0.68**	-0.21**	0.09	0.21**	(0.90)				
9. Anxiety Time 1	6.89	(5.33)	-0.03	0.29**	0.65**	-0.60**	-0.33**	0.11	0.27**	0.76**	(0.91)			
10. Anger Time 1	4.72	(5.03)	-0.11	0.18**	0.51**	-0.40**	-0.25**	-0.03	0.12*	0.48**	0.51**	(0.88)		
11. Depression Time 2	7.81	(6.06)	-0.09	0.27**	0.62**	-0.60**	-0.27**	0.10	0.14*	0.77**	0.61**	0.39**	(0.89)	
12. Anxiety Time 2	5.99	(5.50)	-0.02	0.25**	0.50**	-0.48**	-0.32**	0.04	0.17**	0.55**	0.70**	0.33**	0.71**	(0.91)
13. Anger Time 2	3.93	(4.40)	-0.09	0.17**	0.45**	-0.33**	-0.27**	-0.00	0.15*	0.38**	0.43**	0.69**	0.50**	(0.90)

N = 290

Biological sex, male = 1, female = 2. Events at Time 1, one event = 2, two events = 3, three or more = 4. Cronbach's Alphas from the present study are presented in brackets

ECQ Event Characteristics Scale, NA not applicable

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Declarations

Conflict of Interest Darrell Eckley, Andrew Allen, Prudence Millear, Karina Rune and Jonathan Mason declare that they have no conflict of interest.

Consent for Publication Informed consent was obtained from all participants prior to their participation in the study.

Animal Rights No animal studies were carried out by the authors for this article.

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