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Review

Affective forecasting and psychopathology: A scoping review

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ABSTRACT

Affective forecasting – estimations of future emotional reactions – is an important aspect of future thinking that informs judgement and decision making. Biases in affective forecasting have been noted generally and with people with emotional disturbances specifically. Still, the role of affective forecasting within models of psychopathology has received little attention. Given the state of the literature, a scoping review method was adopted to summarize and synthesize the methodological approaches used in measuring affective forecasting within the context of psychopathology and the scope of the evidence on this association. Three databases were searched for research published on or before November 13th, 2023. Original quantitative research that examined affective forecasting and its association with psychopathology was reviewed. Data were charted using a form designed for this study. Overall, the review highlights the heterogeneity in operationalization of affective forecasting. The majority of the evidence supports an association between severity of psychopathology and intensity of affective forecasts, with notable exceptions, which are discussed within the scope of methodology and operationalization of affective forecasting. This remains an important process to investigate in information processing models of psychopathology to elucidate its role in the development and maintenance of psychopathology and potential as a target for intervention.

Whether one is contemplating the next five minutes or five years, our idea of the future holds power over our present. People regularly think about their future, mentally simulate possible future events, and rely on their predictions to make plans (Bar, 2009; D'argembeau et al., 2011; Szpunar, 2010). Prediction is core in future-oriented cognition and includes estimations of likelihood of occurrence and/or reactions, enabling people to then set intentions and plans (Szpunar, Spreng, & Schacter, 2014). The process of estimating emotional consequences or one's emotional reactions to future life events is known as affective forecasting (Gilbert, 2009; Wilson & Gilbert, 2003). Like other aspects of future-oriented cognition, affective forecasting is an important process that informs decision-making and behaviour (Gilbert & Wilson, 2007) as predictions of future affect have motivational effects and help people make choices that optimize their wellbeing and maximize their happiness (Kurtz, 2018; Lowenstein & Lerner, 2003; Meller & McGraw, 2001; Miloyan & Suddendorf, 2015; Suddendorf, 2017). The implication of affective forecasting varies in importance depending on the future decision under consideration, such as choosing a film, changing career paths, engaging in self-harm, or consenting to treatment, and thus its application is vast.

Generally, people tend to overestimate the intensity of their future emotional reactions to personal life events, known as the intensity bias (Gilbert, Gill, & Wilson, 2002; Wilson & Gilbert, 2003, 2005, 2013). That is, people are likely to imagine worse or better emotional outcomes in relation to future personal life events than they experience when the event takes place. A negative intensity bias has been shown with children as young as 4 and 5 years as well, where they overestimated the degree to which they would feel sad in relation to losing a game, whereas a positive forecasting bias in relation to winning was not supported in this sample (Gautam, Bulley, von Hippel, & Suddendorf, 2017). The intensity bias is mainly attributed to individuals' failure to consider one's capacity to regulate emotion or cope with distress in the future (i.e., immune neglect; Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998; Hoerger, Quirk, Lucas, & Carr, 2009; van Dijk, Dillen, Seip, & Rotteveel, 2012; van Dijk, van Dillen, Rotteveel, & Seip, 2017) and the impact of other important events that may take place around the same time and mitigate the emotional reactions (i.e., focalism; Wilson & Gilbert, 2005). Although the intensity bias can be normative with motivational underpinnings (Morewedge & Buechel, 2013), pronounced levels of overestimated negative emotional reactions may lead to maladaptive coping and avoidance and interfere with the pursuit of meaningful activities or health care decisions (Halpern & Arnold, 2008;

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Hoerger, Scherer, & Fagerlin, 2016; Lowenstein & Lerner, 2003; Wilson & Gilbert, 2003, 2005). Biases in prediction have been noted as reasons behind suboptimal choice and difficulties pursuing a future that optimizes individuals' happiness (Hsee & Hastie, 2006).

The estimation of the emotional impact of future life events is particularly important for individuals with mental health disorders who experience general disturbances in emotion (Thompson et al., 2017), whereby high negative emotions or blunted (i.e., diminished) positive emotions can be overwhelming or functionally debilitating, possibly leading to avoidant or self-destructive behaviour (Bauer et al., 2022; Marroquin, Nolen-Hoeksema, & Miranda, 2013). Indeed, affect is believed to be "the brain's common currency for value" driving people to make decisions based on their contemplations of the future (Seligman, Railton, Baumeister, & Sripada, 2013) with more robust support for the role of predicted emotion, verses current emotion, in shaping behaviour and judgement (DeWall, Baumeister, Chester, & Bushman, 2016). Predictions about emotional reactions towards future life events may then play a critical role in meeting daily functional expectations for those struggling with emotional distress, especially that avoidance of internal and external states of intense emotion or distress is a core feature in emotional disorders (Barlow, Sauer-Zavala, Carl, Bullis, & Ellard, 2014).

Challenges with future thinking, including emotional predictions, are considered common in clinical populations and are key to functioning impairments (Henry, Addis, Suddendorf, & Rendell, 2016). For example, if someone predicts a situation will make them feel extremely anxious they may choose to avoid it and if they predict that an activity will make them feel little happiness they may again choose not to pursue it. Therefore, affective forecasts have the potential to shape judgement and intention and ultimately impact on behaviour. The ability to engage in daily activities and meet functional expectations at various ages, such as attending school in childhood and adolescence, maintaining a job in adulthood, and forming friendships and engaging in social events across the lifespan are important aspects of daily life and wellbeing. Impairment in meeting daily expectations and functioning is implicated in various psychopathologies and is a key component in mental disorders (American Psychiatric Association, 2013) both as a marker of debilitating psychopathology but also as a potential risk factor for the development of a comorbid disorder (Cummings, Caporino, & Kendall, 2014). Should intensity levels of affective forecasting interfere with daily decision making and behaviour, then it is potentially an important process to investigate in relation to the development and maintenance of psychopathology.

Much work has been done to delineate the role of information processing biases – attention, recall, and interpretation – in the development and maintenance of different types of psychopathologies (see reviews: Gibb & Coles, 2005; Mathews & MacLeod, 2005; Woud, 2022). Biases in expectations about the occurrence and consequences of future outcomes have also been implicated in most psychopathologies (for review see de Jong & Daniels, 2020). In their model, Rief et al. (2015) delineate the role of expectation as a core process in the maintenance of psychopathology. The role of expectations in various psychopathologies is also explicated in the prospective reformulation of anxiety and depression-related disorders (Seligman et al., 2013) and in other future thinking models of psychopathology (e.g., Miloyan et al., 2014; Roepke & Seligman, 2016). Nonetheless, a detailed account or consideration of affective forecasting and biases in affective forecasting in these models of information processing in relation to psychopathology is largely missing.

Understanding the scope of the evidence on the role of affective forecasting in psychopathology is in line with current scientific directions to study transdiagnostic psychological processes that can be used to classify, identify, and treat mental health disorders (Cuthbert & Insel, 2013; Dalgleish, Black, Johnston, & Bevan, 2020; Insel et al., 2010). One of the main directions for research on affective forecasting will be to assess the degree to which affective forecasts are uniquely informative in relation to vulnerability towards developing or maintaining psychopathology. Part of the challenge in pursuing such directions is the heterogeneity of the methodology and methods used to assess this process and potential biases and variety of psychopathology domains in question. All these factors may complicate the contextualization and integration of study findings and limit future directions in this area.

The heterogeneity of the methods used to measure affective forecasting and its association with psychopathology would benefit from review and summary. Given the state of literature, a scoping review was the preferred method due to its exploratory nature and potential to highlight conceptual and methodological issues that would advance future research. The aim of this scoping review is to summarize and synthesize the approaches used to date to measure affective forecasting and the intensity bias in affective forecasting within the context of psychopathology and assess the scope of the evidence regarding their association. The three primary intensity ratings used regularly in the affective forecasting literature and that are of interest to this study include: 1) forecasted affect, assessed using ratings of predictions of future emotional states or the emotional impact of a particular future event/outcome; 2) experienced affect, assessed using ratings of current emotional state/general affect or experienced emotion in relation to an event/outcome taking place; and 3) intensity bias, characterized by the degree to which forecasted affect represents an overestimation of experienced affect. Within this context, blunted refers to lower intensity or diminished overestimation. This review will map and summarize the evidence, identify gaps in the literature, make preliminary conclusions about the association between affective forecasting and psychopathology, and make recommendations for future research directions. In order to address the overall aim of this scoping review, two main research questions were identified:

1) What methods are used to measure affective forecasting (forecasted affect, experienced affect, and/or intensity bias) when examining its association with psychopathology in quantitative studies?
2) What types of psychopathology have been assessed in relation to affective forecasting (forecasted affect, experienced affect, and/or intensity bias) and what are the main findings reported in respect to this association?

1. Method

The updated methodological guidance on scoping reviews was followed (Peters et al., 2020). The PRISMA-ScR reporting guideline and checklist (Tricco et al., 2018) is included in the supplementary material. This review does not have an associated registered protocol.

1.1. Search strategy

Search strategy was developed in consultation with a librarian at the University of Glasgow (Scotland). Three electronic databases were originally searched – Embase, PsychINFO, and PsycArticles – for studies published until June 3, 2023. An updated search was conducted using the same databases for studies published until November 13, 2023. These databases were chosen for their suitability in capturing psychological research of interest. Search strings are included in the appendix.

1.2. Study selection

Inclusion criteria were set a priori, before the screening process commenced, and required studies to have: 1) affective forecasting measure that captures forecasted affect, experienced affect, and/or intensity bias in affective forecasting; 2) psychopathology measure or comparison group when clinical sample is recruited (psychopathology was kept deliberately broad to include various mental health problem domains); 3) studies published in English; 3) peer reviewed studies; 4)

quantitative studies, including observational, experimental, quasi-experimental, and mixed-method study designs. Qualitative studies, grey literature, and studies not written in English were excluded. Using the inclusion and exclusion criteria, the titles and abstracts were screened to determine their relevance and suitability for this scoping review. This was then followed by full text screening, during which the articles were read in detail to determine eligibility for inclusion in the scoping review.

1.3. Data charting and synthesis

A table specific to this review was created for data charting which captured information about: Author, year of publication, study location, aim/s relevant to this review, participant numbers and characteristics (when appropriate separated for clinical and control groups), study design, affective forecasting paradigm and scores (including forecasted affect, experienced affect, and/or intensity bias scores), psychopathology domain/s, and key findings relevant to this review. Only information pertaining to affective forecasting – forecasted and experienced affect and intensity bias – and psychopathology was extracted from the studies. The relevant information extracted was summarized and tabulated for the review purposes. A descriptive approach to data analysis is taken in this scoping review with basic coding of data to relevant categories that capture the methods used to measure forecasted affect, experienced affect, and/or intensity bias in affective forecasting and the domains of psychopathology investigated. The key relevant findings regarding the association between affective forecasting and psychopathology are summarized.

2. Results

2.1. Results of search strategy and selection process

De-duplication and screening was conducted in EndNote. Titles and abstracts were screened for all unique records followed by full-text screening for articles to assess eligibility for inclusion (see breakdown of process in Fig. 1). Records excluded in the screening process as shown in Fig. 1 refer to studies that did not meet the inclusion criteria.

All studies included were published in 2012 and onwards with the majority being published in the past five years (75%; 2018 until 2023). All studies were conducted with university or adult participants. In terms of location, 16 studies were conducted in the USA, four studies in China, two studies in Germany, and one study in Australia and one in Canada (See Table 1).

2.2. Affective forecasting paradigm/method

Fig. 2 shows a schematic of the approaches used to measure affective forecasting. First, studies were identified based on whether the paradigm includes a forecast only measure (n = 10) or a forecast and

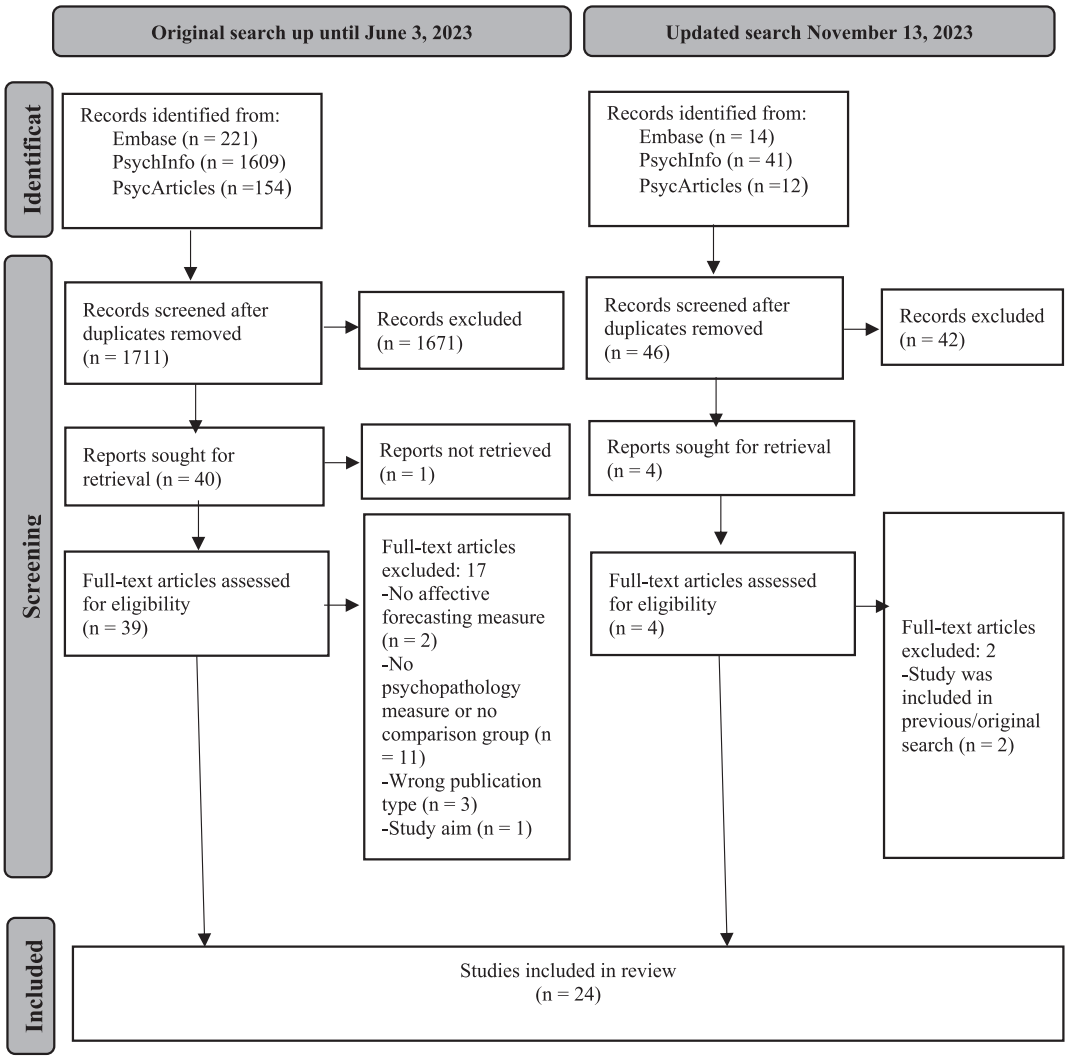

Fig. 1. PRISMA flowchart of the study selection process.

Table 1
Overview of included studies.

Author (year of publication), country	Aims/purpose relevant to review questions	Sample characteristics	Design and setting	Affective forecasting paradigm and score	Psychopathology domain/s
Anderl, Dorrough, Rohrbeck, and Glöckner (2022), Germany	Examine the predictive role of trait social anxiety on forecasted and experienced affect to resource allocations	Study 1 Online sample n = 248 (female: n = 157, male: n = 89, other: n = 2; Mean age = 35, SD = 12.23) Study 2 Online sample Group A n = 218 (female: n = 156, male: n = 61, other: n = 1; Mean age = 29.03, SD = 9.45) Group B N = 201 (female: n = 152, male: n = 48, other: n = 1; Mean age = 28.74, SD = 10.41)	Study 1 Online experimental study Study 2 Online experimental study	Study 1 Participants forecasted their affective reactions to possible allocations in the Dictator Game and then reported on their experienced affect in session two in response to their experience in the game. Both forecasted and experienced affect were rated on a Likert scale ranging from 0 to 5 (from 0 = not at all to 5 = very strongly) for four affect descriptions (grateful, happy, disappointed, and angry) Score: Separate forecasted and experienced mean negative affect scores and controlled for experienced negative affect scores in correlational analysis. Study 2 Forecasted and experienced negative affect were assessed in response to different levels of partner allocation in a Dictator game (Group A) and Ultimatum game (Group B) using an upset subscale. Score: Separate forecasted and experienced negative affect scores.	Social anxiety
Arditte Hall, Joormann, Siemer, and Timpano (2018), USA	Examine the association between social anxiety and affective forecasting biases	Study 1 University sample n = 100 (Mean age = 19.11, SD = 1.19; 67% female) Study 2 University sample n = 104, 52 dyads At fault condition (n = 19 dyads) No fault condition (n = 33 dyads) "Subjects" mean age = 19.29 (SD = 1.40), 60% female, "Partners" with mean age 19.55 (SD = 1.76), 61% female	Study 1 Online observational cross-sectional survey Study 2 Laboratory-based experimental study	Study 1 Participants read 15 vignettes with self as narrator each eliciting either happiness, disgust, or anger and were asked to predict how they would feel in terms of anger and shame if each situation happened on an intensity scale of 1 = not at all to 7 = extremely and duration scale of 1 = not at all to 6 = longer than a few days. Score: Forecasted intensity score for each of type of emotion was calculated for the corresponding types of vignettes. Study 2 Prior to computer task (two conditions: At Fault and No Fault), participants forecasted how they would feel following hypothetical outcomes: "1) winning or losing money as a team, 2) Partners winning or losing money for the team, and 3) Subjects winning or losing money for the team." Forecasts were made on 7-point Likert scale, ranging from 1 (Very unhappy) to 7 (Very happy). Experienced affect ratings were also provided before the computer task, at mid-point during the task, and upon completion of the (post-task) on the same 7-point Likert scale.	Study 1 Social anxiety Study 2 Social anxiety

(*continued on next page*)

Table 1 (*continued*)

Author (year of publication), country	Aims/purpose relevant to review questions	Sample characteristics	Design and setting	Affective forecasting paradigm and score	Psychopathology domain/s
				Score: Difference scores were used for intensity bias by subtracting post-task affect ratings from forecasted affect ratings.	
Arditte Hall, Coleman, and Timpano (2020), USA	Examine the association between negative and positive affective forecasting biases and social anxiety	Online sample $n = 93$ (Mean age = 36.24, SD = 22.64; 51.6% female)	Online observational cross-sectional survey	Adapted version of the vignette measure used in Study 1 in Arditte Hall et al. (2018). Score: Forecasted scores for intensity of guilt and shame ratings.	Social anxiety
Dev, Arditte Hall, and Timpano (2023), USA	Examine the unique associations between affective forecasting bias and depression, trait anxiety, and social anxiety	University sample $n = 114$ participants with mean age = 19.28 (SD = 1.35; 58.6% female)	Laboratory based experimental study	Same lab-based task used in Study 2 in Arditte Hall et al. (2018). Score: Difference scores were used for intensity bias by subtracting post-task affect ratings from forecasted affect ratings.	Depression Anxiety Social anxiety
Glenn, Chow, and Teachman (2019), USA	Examine how levels of social anxiety associate with affective forecasting accuracy to positive and negative social evaluations	University sample $n = 187$ with mean age = 19.24 (SD = 1.84; 70.4% female) High ($n = 89$) and low ($n = 98$) social anxiety groups	Laboratory based experimental study	Participants forecasted the intensity of their emotional reactions in relation to receiving average, above average, or below average evaluation prior to completing a speech task. Actual affect was also measured upon completion of the speech task and receiving evaluation. Participants predicted and reported the intensity of their affect using the following four domains: positive/negative feelings, happy/ sad, calm/ anxious, and self-assured/ ashamed on a 200-point range (−100 to +100) using a visual analog scale. Score: Difference score was used for the negative and positive intensity bias by subtracting actual from predicted affect.	Social anxiety
Hezel, Stewart, Riemann, and McNally (2019), USA	Examine the association between affective forecasting accuracy and OCD	Community and clinical sample Total $n = 123$ OCD: $n = 41$ with mean age = 26.1 (SD = 8.4; 63% female) SAD: $n = 40$ with mean age = 31 (SD = 13.6; 55% female and one transgender woman) Non-anxious and non-OCD: $n = 42$ with mean age = 37.6 (SD = 16.1; 36% female)	Laboratory-based Experimental study	An experimental coin toss affective forecasting accuracy task was used. All affect ratings were made on a scale of a scale from 0 (not at all) to 100 (extremely) in relation to four affective states (happy, sad, pleased, and disappointed). Participants reported on their current affect prior to the task and predicted how they would feel following the task should they win or lose. Participants also reported their affect immediately after completing the task and ten minutes after the task. Scores: Separate forecasted and experienced affect scores were used. Forecasted affect score was the difference between subjects' baseline affect when making the forecast and their predicted affect. Actual affect score was the difference score between affect just prior to and immediately following the coin toss.	Obsessional beliefs Social anxiety

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Table 1 (*continued*)

Author (year of publication), country	Aims/purpose relevant to review questions	Sample characteristics	Design and setting	Affective forecasting paradigm and score	Psychopathology domain/s
Hoerger, Quirk, Chapman, and Duberstein (2012), USA	Examine the association between affective forecasting and symptoms of depression, anxiety, and hypomania	University sample $n = 325$ with mean age = 19.8 (SD = 2.1, 80.3% female)	Online observational prospective design	One month before Valentine's Day (2007) participants predicted how they would feel on the evening of Valentine's Day and the subsequent two days in the event they had a date (pleasant) or not having a date (unpleasant). On Valentine's Day and the two subsequent days, participants reported their actual emotional states and whether they had a date. Emotion ratings (happiness, sadness, pleasure, gloominess, enjoyment, and misery) were made on a scale of 1 = not at all to 9 = extremely. Score: Residualized difference scores were used to reflect intensity bias – residualized difference scores are the residual variation in forecasted affect after using regression to control for actual reactions. Authors also included a footnote of the results using difference score (bias = predicted – actual ratings)	Depression Anxiety Hypomania
Horne, Bernstein, and McNally (2020), USA	Examine whether expectations of enjoyment impact experienced enjoyment at various levels of anhedonia	Sample 1 Online sample $n = 155$ (18–35 years 39.4% female) 31% with anhedonia Sample 2 University sample $n = 105$ (ages between 18 and 35 years, 70.5% female) 41% with anhedonia	Online experimental study	Participants were randomly assigned to one of two conditions (high expectancy or low expectancy) and asked to predict how they would feel before watching a video and then report on their affective experience following the video. The intensity of forecasted and experienced affect was rated on a 6-item questionnaire with a scale of 0 to 100. Only ratings of amusement were of interest. Score: Separate forecasted and experienced affect scores.	Anhedonia
Ji and MacLeod (2023), Australia	Examine the role of expectancy biases, including biases in the expected emotional impact, in dysphoria-linked behavioural choice	University sample $n = 176$ with mean age = 20.37 (SD = 29.37; 73.9% female)	Laboratory based experimental study	Participants were offered a choice to engage in a "Coin Toss Game for Charity" with two possible outcomes: 1) objectively positive outcome whereby $10 would be donated if the result was more heads than tails; and 2) objectively negative outcome whereby $0 would be donated if the result was more tails than heads. Participants choosing not to engage in the game would spend five minutes in the waiting area and $5 would be donated. Participants rated their expected emotional response in relation to each outcome on a scale from −50 (extremely negative emotional impact) to 50 (extremely positive emotional impact) Scores: Forecasted positive and negative affect scores for possible positive and negative outcomes.	Dysphoria
Marroquin et al. (2013), USA	Study 2 Examine the association between	Community and university sample $n = 289$ with mean age = 20.2	Observational cross-sectional survey	Affective forecasts were provided for 18 negative and 18 positive hypothetical future life	Depression

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Table 1 (*continued*)

Author (year of publication), country	Aims/purpose relevant to review questions	Sample characteristics	Design and setting	Affective forecasting paradigm and score	Psychopathology domain/s
	affective forecasting and history of suicide attempt	years (71.97% female) $n = 27$ dysphoric with suicide attempt history $n = 127$ dysphoric no attempt history $n = 135$ nondysphoric controls		events. Participants used a rating scale of 1 (unhappy) to 7 (very happy). Scores: Forecasted affect scores for negative events and positive events were computed by averaging ratings across the respective items.	History of suicide attempt
Marroquín and Nolen-Hoeksema (2015), USA	Examine whether negativity in affective forecasting in depression is explained by individual's differential use of emotion as information	Community and university sample $n = 161$ with average age 20.9 (SD = 3.1; 70% female) $n = 77$ dysphoric individuals $n = 84$ nondysphoric individuals	Online observational cross-sectional survey	Same as Marroquin et al. (2013)	Depression Anhedonia
Martin and Quirk (2015), USA	Examine the association between social anxiety and the accuracy of positive and negative affective forecasting	University sample $N = 181$ respondents for Valentine's Day and $n = 172$ two respondents for St. Patrick's Day (141 completed ratings for both holidays and 70 provided ratings for one) Combined sample mean average age 19.87 years (SD = 3.25; 78.2% female)	Online observational prospective study	Before major holidays (Valentine's Day and St. Patrick's Day) participants were asked to predict their mood using six emotions (happy, joyful, excited, sad, miserable, and upset). For Valentine's Day they were asked to predict their emotion in the event they have a date or not. Experience sampling on the day of each holiday was carried out whereby participants were asked to report on their current affect using the same six dimensions five times a day. Emotion dimensions were rated on 5-point likert scale 1 (not at all) and 5 (extremely) Scores: Forecasted and experienced affect composites for three negative and three positive emotions were created. Bias scores were calculated using residualised difference scores.	Social anxiety Trait anxiety Depression
Mathersul and Ruscio (2020), USA	Examine differences between affective experiences and forecasts and memories across generalized anxiety and major depression as compared to controls	Community sample GAD group $n = 36$, mean age = 31.62 (SD = 9.24; 83.3% female) MDD group $n = 38$, with mean age = 36.38 (SD = 12.33; 71% female) Comorbid GAD and MDD with $n = 38$, mean age = 33.60 (SD =11.35; 52.6% female) Control group, $n = 33$, mean age = 28.61 (SD = 10.42; 66.7% female)	Observational Prospective design (3 sessions) with ecological momentary assessments (EMA) with time-stratified random sampling	Affective forecasts were measured by having participants predict the intensity of positive and negative affect they would feel in general in the upcoming week. Three negative and positive emotions (anxious, sad, dissatisfied with myself, happy, determined, and proud) were used. Ratings were provided on a 5-point scale (0 = not at all to 4 = very much). Experienced affect was measured using EMA and asked participants to rate their current affect with the same scale as that used for affective forecasts. Scores: Separate forecasted and experienced affect scores. For intensity bias, separate ANCOVAs were run in which diagnostic group was used to predict forecasts after adjusting for experienced affect (included in the model as an additional covariate).	Generalized anxiety Depression
Moore, Chan, Huang, and Martin (2019), USA	Examine the association between positive and affective forecasting accuracy towards social interactions in social anhedonia	University sample Social anhedonia group $n =$ 21, with mean age 20.25 (SD	Laboratory based experimental study	Affective forecasts measured before a social interaction task using eight negatively and positively valenced emotions	Psychosis proneness (social anhedonia)

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Table 1 (*continued*)

Author (year of publication), country	Aims/purpose relevant to review questions	Sample characteristics	Design and setting	Affective forecasting paradigm and score	Psychopathology domain/s
		= 1.91; 90.47% female) Control group n = 23 with mean age 20.04 (SD = 2.22; 91.30% female)		(relaxed, calm, happy, excited, fatigued, sad, nervous, upset) and asked to report how they expected to feel during the social interaction (1 = not at all to, 5 = extremely). Experienced emotion was rated using the same rating scale upon completion of the social interaction task. Scores: Separate scores for forecasted and experienced affect.	
Pan et al. (2023), China	Explore the moderating/ mediating role of affective forecasting in the association between hyperarousal and life satisfaction.	Online sample N = 5546 with mean age = 30.69 (SD = 10.75; 52.3% female)	Online Observational cross-sectional survey	Affective forecasts were reported on expected feelings three months later using four negative and four positive affect items ("calm", "relax", "excited" and "energetic", "worried", "lonely", "angry" and "boring"). Scores: Composite positive and negative forecasted affect scores.	Hyperarousal
Rizeq and McCann (2019), Canada	Examine mediating role of emotion dysregulation upon encountering the possibility of an emotionally evoking event on the relationship between trauma experience and symptomatology and negative affective forecasts towards academic failure or cyberbullying.	University sample n = 368 with mean age = 20.84 (SD = 5.78; 73.6% female)	Laboratory-based observational cross-sectional survey	Participants randomly presented with one of two hypothetical scenarios/vignettes and asked to predict how they would feel (sad, bad, negative, and upset) upon encountering the actual event using a scale of 1 = not at all to 9 = extremely. Score: Composite forecasted affect score.	Trauma symptoms
Shovestul et al. (2022), USA	Examine the association between schizophrenia-spectrum disorders and social affective forecasting accuracy and the role of social anhedonia in this association	Community sample Schizophrenia or schizoaffective disorder n = 34 with mean age = 42.5 (SD = 12.8; 53% female) Control group n = 43 with mean age = 41.3 (SD = 12.5; 44% female)	Observational prospective study with experience sampling method	For the first daily diary entry, participants were asked to provide brief descriptions of the meaningful social interactions they anticipated over the next 24 h. Participants then reported on how they anticipated feeling during the interaction using 13 emotions, six of which were positively valenced (enjoyment, pleasure, enthusiasm, interest, excitement, happy/joyful) and seven of which were negatively valenced (disinterest, upset, afraid/fearful, anxiety/ nervousness, displeasure, anger, sadness). Emotions were rated on a scale of 1 (Very slightly or Not at all) to 5 (Extremely). Participants reported on their experienced emotion using the same scale. Scores: Forecasted affect scores were calculated based on absolute difference between predicted and experienced emotions and used as the outcome score.	Social anhedonia
Thompson et al. (2017), USA	Examine whether the intensity and accuracy of positive and negative affective forecasts differs across individuals with remitted Bipolar I disorder, MDD, and healthy controls and whether there are any within group differences in accuracy depending on valence	Community sample Remitted BD n = 31 with mean age = 31.3 (SD = 10.7; 55% female) Remitted MDD n = 21with mean age = 31.5 (SD = 11.4; 67% female) Controls n = 32 with mean	Observational prospective study with experience sampling method	Affective forecasts were reported at baseline in relation to how participants predicted they would feel in general the next day or over the next week using positive and negative affect subscales (Positive: amusement, awe, compassion, contentment, gratitude, hope, joy, love, and pride; Negative: anger, contempt, disgust,	Mania Depression

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Table 1 (*continued*)

Author (year of publication), country	Aims/purpose relevant to review questions	Sample characteristics	Design and setting	Affective forecasting paradigm and score	Psychopathology domain/s
		age = 30.8 (SD = 8.8; 59% female)		embarrassment, fear, guilt, sadness, and shame). A five point likert-type rating scale was used (1 = not at all to 5 = extremely). The same subscales were used to measure in the moment positive and negative affect using 6-day ESM. Scores: Separate forecasted and experienced affect scores were used. For intensity bias, regression was used with forecasted and experienced scores.	
Wenze, Gunthert, and German (2012), USA	Examine the association between affective forecasting and recall biases and depression and anxiety symptoms	University sample n = 120 with mean age = 19.72 (SD = 1.58; 67.5% female)	Observational prospective design with experience sampling method	Participants reported on their predictions about how they would feel in general over the course of a week using 10 positive and negative mood items (sad, happy, angry, nervous, enthusiastic, jittery, hostile, excited, lonely, content). Seven-point likert scale was used (1 = not at all to 7 = a lot). Participants also reported on their most important anticipated event and their respective affective forecasts using the same rating scale. Over the 7 days, participants reported their mood 4 times a day using the same 10 items from the forecasting stage. Scores: Separate forecasted and experienced affect scores. Intensity bias was assessed in two ways: 1) using actual mood as covariate and forecasted mood as dependent variable in regression model and 2) using difference score as outcome in regression model.	Anxiety Depression
Wenze and Gunthert (2018), USA	Examine whether affective forecasting biases predict symptoms of depression and anxiety in the context of life stress	University sample n = 72 (follow up sample from Wenze et al., 2012), mean age = 19.63 (SD = 1.48; 72.22% female)	Observational prospective design with ecological momentary assessments	Participants reported on their predictions about how they would feel over the upcoming week using 10 positive and negative mood states (happy, excited, enthusiastic, content, sad, lonely, angry, hostile, jittery, nervous). A likert-type scale of 1 = not at all to 7 = a lot was used. During EMA, participants reported how they were feeling using the same 10 items and 7-point likert scale. Score: Difference scores for positive and negative intensity bias by subtracting average levels of experienced positive and negative mood from predicted levels.	Anxiety Depression
Zetsche, Buerkner, and Renneberg (2019), Germany	Examine negative affective forecasting biases as a function of depression	Community sample Individuals with depression n = 30, mean age = 34.87 (SD = 10.85; 83.3% female) Matched controls n = 37 with mean age = 35.11 (SD = 9.37; 81.1% female) University sample n = 56	Observational prospective design with experience sampling method	Participants predicted how they would feel in general over the course of the following four days on six emotions (sad, downhearted, nervous, insecure, cheerful, and carefree). A five-point likert scale of 1 (not at all) to 5 (very much) was used. For a period of four days, participants were asked five times a day to report on their current feeling	Depression

(*continued on next page*)

Table 1 (*continued*)

Author (year of publication), country	Aims/purpose relevant to review questions	Sample characteristics	Design and setting	Affective forecasting paradigm and score	Psychopathology domain/s
		Mean age = 25.6 (SD = 4.56; 82.1% female)		using the same items as above. Score: Difference score was used for intensity bias by subtracting the actual mood levels from the forecasted mood levels (additional analysis were conducted using residual scores and multiple regression approaches).	
Zhang et al. (2020), China	Examine positive and negative social affective forecasting as a function of social anhedonia	Online sample Individuals with social anhedonia $n = 40$ Mean age 20.7 (SD = 4.52; 62.5% female) Healthy controls $n = 46$ Mean age = 21.87 (SD = 2.61; 76.1% female)	Laboratory-based observational cross-sectional survey	Participants reported the forecasted affect using the Social Affective Forecasting task with hypothetical vignettes that reflect two dimensions: social/non-social and positive/negative. Each of the four conditions has two daily events, with eight in total. First participants rated their current emotion, then they were asked to imagine the event, describe it and rate their anticipated emotion from 1 (very unhappy) to 9 (very happy). Score: Separate composite forecasted affect scores for positive and negative social and non-social events.	Social anhedonia
Zhang et al. (2022), China	Examine the association between affective forecasting and subclinical psychopathology	Community sample $n = 319$ participants with mean age = 21.94 (SD = 2.55; 67.4% female)	Laboratory-based observational cross-sectional survey	Same as Zhang et al., 2020. Score: Separate composite forecasted affect scores for positive and negative social and non-social events.	Schizotypal traits Autism traits Depression
Zhang et al. (2023)	Study 2 Examine the association between schizotypal traits and anticipated pleasure and displeasure and the pattern of anticipated pleasure and displeasure in people with schizophrenia versus healthy controls	Study 2 Online student sample $n = 2655$ participants 18 years of age or older Outpatient sample with schizophrenia $n = 47$ with mean age = 32.85 (SD = 6.72; 61.70% female) Matched healthy control community sample $n = 47$ with mean age = 31.30 (SD = 5.13; 48.9% female)	Study 2 Observational cross-sectional study	Study 2 Participants reported the forecasted affect using the Social Affective Forecasting Scale with 17 hypothetical vignettes subsumed within four subscales: positive social, positive nonsocial, negative social, negative nonsocial. Participants rated their anticipated emotion on a scale of 1 (very unhappy) to 7 (very happy). Scores: Separate composite forecasted affect scores for positive and negative social and non-social events	Schizotypal traits Schizophrenia

experience measure ($n = 15$), those were further broken down into studies assessing future general affect or mood (total $n = 6$; forecast and experience subgroup $n = 5$; forecast only subgroup $n = 1$), or affect in relation to specific future life events (total $n = 17$; forecast and experience subgroup $n = 10$; forecast only subgroup $n = 9$). The psychopathology domains examined across the studies included: anxiety, social anxiety, trait anxiety, OCD, depression, dysphoria, hypomania, mania, history of suicide attempts, trauma symptoms, hyperarousal symptoms, anhedonia and social anhedonia, psychosis proneness, schizotypal traits, schizophrenia, and autism traits. The summary of the key findings regarding the association between those domains and affective forecasting (and/or intensity bias) is presented in the below sections.

2.3. Forecast only

Scores in this group were all based on either average or composite scores of forecasted affect, which were then used in analysis examining the association with specific psychopathology domains.

2.3.1. General affect

Pan et al. (2023) measured forecasts about general positive and negative affect in the future. Both negative and positive forecasted affect scores were significantly positively and negatively associated with hyperarousal symptoms, respectively.

2.3.2. Specific life events

Studies used various vignettes describing hypothetical life events and asked participants to forecast their emotional reactions using single item or multiple item rating scales. The same set of 15 vignettes assessing affective forecasting were used in two studies to examine the association between affective forecasting and social anxiety (Arditte Hall et al., Study 1 in Arditte Hall et al., 2018; Arditte Hall et al., 2020). The

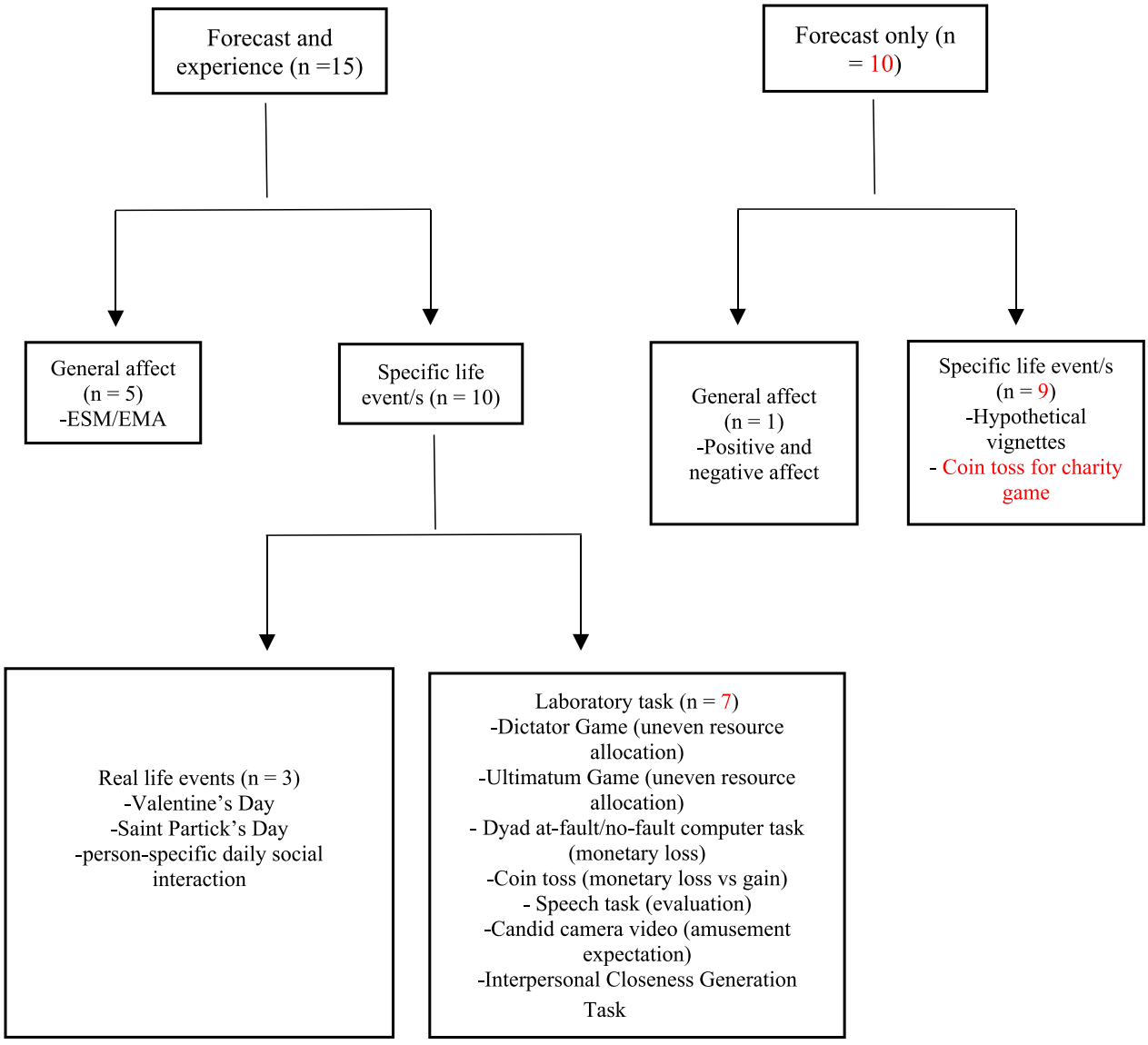

Fig. 2. Schematic of affective forecasting paradigms.
Note. The total shows $n = 25$ because there were two studies in Arditte Hall et al. (2018) that used separate samples and approaches.

vignettes represented interactions between two people, the narrator and another person. Each interaction was designed to represent a situation where the narrator does something to elicit one of three emotions: disgust, anger, or happiness. In the 2020 study, the intensity of affective forecasts, regardless of the emotion rated (guilt and shame) was significantly associated with symptoms of social anxiety, such that more intense negative forecasts were associated with more severe social anxiety. In the 2018 paper, in the vignettes where the person elicits happiness from others, both the intensity of guilt and shame forecasts were significantly associated with higher social anxiety. On the other hand, only the intensity of forecasted guilt and forecasted shame was significantly associated with higher social anxiety in the disgust and anger vignettes, respectively.

The same set of 36 vignettes were used in two studies conducted by Marroquin et al. (2013) and Marroquín and Nolen-Hoeksema (2015). In both studies, significantly less intense positive affective forecasts (i.e., blunted positive affective forecasts) towards positive future events were reported by individuals with dysphoria compared to individuals without dysphoria. Those groups did not significantly differ in the negative forecasts towards negative events. In the 2013 study, blunted positive affective forecasts further distinguished individuals with dysphoria with suicide attempts from those with dysphoria without suicide attempts.

Zhang et al. (2020) and Zhang et al. (2022) used the same set of eight vignettes measuring social affective forecasting in relation to social anhedonia (2020) and schizotypal traits, depressive symptoms and autistic traits (2022). In the 2020 paper, individuals with social anhedonia predicted significantly lower happiness in relation to positive events than individuals without anhedonia. On the other hand, no statistically significant difference was found in relation to negative events between those groups. In the 2022 study, schizotypal traits were the only domain with a significant association, specifically with lower forecasted positive affect in relation to positive events. When the subdimensions of schizotypal traits were examined, higher interpersonal features were associated with lower forecasted positive affect in relation to positive social events only, with a non-significant association in relation to positive non-social events. Zhang et al. (2023) used a validated Social Affective Forecasting Scale and examined the association with schizotypal traits and schizophrenia. Interpersonal features of schizotypal traits were associated with lower forecasted pleasure for future positive social and non-social events. The cognitive-perceptual features of schizotypal traits were associated with higher forecasted pleasure for positive social events and displeasure for negative non-

social events. Disorganization features were associated with lower forecasted displeasure for negative social events. The group with schizophrenia forecasted lower displeasure for future negative social events compared to matched controls. No other significant differences were reported between the groups on the social affective forecasting scale.

Ji and MacLeod (2023) used an experimental paradigm with a coin toss game and asked participants to forecast the emotional impact of two possible outcomes: win or loss for charity. They found that higher dysphoria symptoms were associated with higher forecasted negative affect in relation to the negative outcome. No significant association was found between forecasted affect and dysphoria in the positive outcome condition. In Rizeq and McCann (2019), participants were randomly presented with one of the two hypothetical future life events. The intensity of negative affective forecasts to the cyberbullying and academic failure vignettes scores were both significantly associated with more severe trauma symptoms.

2.3.2.1. Summary of findings. Out of the nine studies reporting on forecasted affect towards specific life events, four reported significant associations between more intense negative affective forecasts and psychopathology (Arditte Hall et al., 2018; Arditte Hall et al., 2020; Ji & MacLeod, 2023; Rizeq & McCann, 2019) and four reported significant associations between less intense positive affective forecasts and psychopathology (Marroquin et al., 2013; Marroquín & Nolen-Hoeksema, 2015; Zhang et al., 2020; Zhang et al., 2022). Two reported no significant association between the intensity of negative affective forecasts and psychopathology (Marroquin et al., 2013; Marroquín & Nolen-Hoeksema, 2015; Zhang et al., 2020), and one reported no significant association between the intensity of positive affective forecasts and psychopathology (Ji & MacLeod, 2023). Zhang et al. (2023) reported distinct associations depending on the aspect of schizotypal traits and type of vignette, as described above.

2.4. Forecast and experience

Scores in this group of studies varied depending on the aim and analytic approach taken. When only examining forecasted and experienced affect's association with psychopathology independently, then composite or average scores for these respective domains were used. When the intensity bias in affective forecasting was of interest, then the following approaches were used: 1) difference scores (difference between forecasted and experienced affect ratings); 2) residualised difference score (i.e., the residual variation in forecasted affect after using regression to control for actual reactions); 3) separate forecasted and experienced affect scores where forecasted affect score is an outcome and experienced affect score is included as a covariate in a regression or ANCOVA model.

2.4.1. General affect/mood

All studies in this subgroup used an experience sampling method/ecological momentary assessment in their design. Thompson and colleague's (Thompson et al., 2017) study showed that the remitted MDD group reported significantly lower forecasted short-term and long-term positive affect than did the remitted Bipolar Disorder I (BD-I) and control groups, which did not differ in their forecasts. Both the remitted MDD group and BD-I group forecasted significantly higher intensity of short-term negative affect than the control group, but only the remitted MDD group reported higher forecasted long-term negative affect than both groups. The remitted BD-I and control group did not differ in their forecasted long-term negative affect. Their reported findings on accuracy are beyond the scope of this review.

In Mathersul and Ruscio (2020), the three clinical groups with MDD, GAD, and comorbid GAD and MDD reported more intense forecasted and experienced negative affect and less intense positive affect than controls. Further, the clinical groups had a stronger negative intensity bias and weaker positive intensity bias than controls using ANCOVA. In the study by Wenze et al. (2012) both depressive and anxiety symptoms significantly and independently predicted higher forecasted negative mood but only depressive symptoms significantly independently predicted lower forecasted positive mood. In terms of intensity bias, when assessed using multiple regression with actual mood ratings as a covariate, both depressive and anxiety symptoms were independently and significantly associated with negative intensity bias but only depressive symptoms were significantly associated with blunted positive intensity bias. When instead a difference score was used as an outcome in the regression model, neither depressive nor anxiety symptoms were significantly associated with a negative intensity bias whereas depressive symptoms were significantly associated with blunted positive intensity bias. Wenze and Gunthert (2018) used difference scores for negative and positive intensity bias and did not find any significant main effect of positive or negative intensity biases on follow-up depression and anxiety symptoms (i.e., change in depression or anxiety symptoms). However, they did find that negative intensity bias's effect on depression symptoms depended on life stress (i.e., significant interaction effect was found).

Zetsche et al. (2019) showed that higher depressive symptoms were significantly associated with more intense levels of forecasted sad mood and less intense levels of forecasted happy mood in a student sample. In a separate sample, individuals with depression reported significantly more intense levels of forecasted sad mood and less intense levels of forecasted happy mood than their healthy counterparts. In terms of intensity bias, they used difference scores in their main analysis (and replicated the findings with residual scores and multiple regression analyses) and showed that depressive symptoms were associated with a negative intensity bias and blunted positive intensity bias. Similarly, individuals with depression showed stronger negative intensity bias and blunted positive intensity bias as compared to healthy controls. Forecasted sad and happy mood scores were also positively and negatively, respectively, uniquely associated with depressive symptoms in both the clinical and nonclinical samples and more strongly than the associations between experienced mood and depressive symptoms.

2.4.1.1. Summary of findings. When examining forecasted affect only, three studies found an association between higher forecasted negative affect and psychopathology and between lower forecasted positive affect and psychopathology (Mathersul & Ruscio, 2020; Thompson et al., 2017; Wenze et al., 2012), with depressive symptomatology being particularly associated with lower forecasted positive affect. In terms of intensity bias, three studies found an association between stronger negative intensity bias and psychopathology and weaker positive intensity bias and psychopathology (Mathersul & Ruscio, 2020; Wenze et al., 2012; Zetsche et al., 2019). On the other hand, Wenze and Gunthert (2018) did not find an association between negative or positive intensity bias and change in psychopathology.

2.4.2. Specific event: laboratory-based task

Distinct experimental tasks with pre post ratings were used across the seven studies in this subgroup. Some studies examined forecasted affect separately, whereas others reported on the intensity bias. In two studies with separate samples and distinct laboratory tasks, Anderl et al. (2022) supported the association between social anxiety and negative affective forecasts, with stronger positive associations with more uneven resource allocations. Hezel et al. (2019) found that anxious (OCD and SAD) and non-anxious groups did not differ in their forecasted and experienced affect as a function of losing or winning money. In Horne et al. (2020), no significant effect was found between severity of anhedonia symptoms and forecasted positive affect in an MTurk sample, whereas in a university sample, higher anhedonia symptom score was associated with lower forecasted positive affect regardless of condition (high versus low

expectation). Moore et al. (2019) found that individuals with social anhedonia forecasted and experienced higher levels of negative affect in relation to the social interaction task as compared to the control group, but that they did not show a significant intensity bias (i.e., their forecasts did not significantly overestimate their actual reported affect). On the other hand, the control group showed a negative intensity bias, with significantly higher forecasted negative than experienced negative affect. Both the social anhedonia and control groups showed a significant blunted positive intensity bias, reporting significantly higher experienced positive affect than forecasted positive affect.

Study Two in Arditte Hall et al. (2018) showed that social anxiety symptom severity was associated with a higher negative intensity bias (i.e., overestimation of forecasted negative affect as compared to experienced affect) in the At-Fault condition but there was no association in the No-Fault condition. This finding was replicated using the same laboratory task with social anxiety, trait-level anxiety, and depressive symptoms; all domains were positively associated with a higher negative intensity bias in the at-fault condition than the no-fault condition (Dev et al., 2023). Glenn et al. (2019) did not examine the association between affective forecasting and social anxiety. Instead they examined differences in intensity bias across evaluation conditions in low and high social anxiety groups separately, which is beyond the scope of this review.

2.4.2.1. Summary of findings. When examining forecasted affect only, two studies found an association between higher intensity in forecasted negative affect and psychopathology (Anderl et al., 2022; Moore et al., 2019). One study reported lower intensity in forecasted positive affect and psychopathology (in one of the two samples only; Horne et al., 2020). Hezel et al. (2019) did not find differences in forecasted and experienced affect as a function of psychopathology, and Moore et al. (2019) did not find differences in forecasted positive affect specifically as a function of psychopathology. An association between a negative intensity bias and psychopathology was supported in two studies with a negative condition as compared to a neutral condition (Arditte Hall et al., 2018; Dev et al., 2023) but not in the study by Moore et al. (2019).

2.4.3. Specific event: real life event

Events chosen varied between public events/holidays to person specific events. Only one study in this subgroup used daily diary methods to assess predicted and experienced affect in relation to expected person-specific daily social interactions (Shovestul et al., 2022). They did not report on the affective forecasts or bias in affective forecasting in relation to psychopathology but rather examined inaccuracy (absolute difference), which is beyond the scope of this review.

Two studies used major holidays. In a study using Valentine's Day as the prospective event, dysphoria, anxiety, and hypomania symptoms were all significantly and separately associated with higher negative intensity bias (Hoerger et al., 2012). When all three psychopathology domains were entered simultaneously in regression analysis, there was only evidence for a unique effect of dysphoria on a negative intensity bias, whereby more severe dysphoria was uniquely associated with higher negative intensity bias and blunted positive intensity bias and across daters and non-daters. In another study that used Valentine's Day, in the daters group, only social anxiety symptoms were significantly positively associated with forecasted positive affect but none of the psychopathology domains (i.e., social anxiety, depression or trait anxiety) were associated with forecasted negative affect (Martin & Quirk, 2015). On the other hand, in the non-daters group, depression and trait anxiety were positively associated with higher forecasted negative affect and negative intensity bias. In addition, social and trait anxiety were both associated with a blunted positive intensity bias. When St. Patrick's Day was the prospective event, social anxiety, trait anxiety, and depression symptoms were all positively associated with forecasted negative affect and a negative intensity bias. Those domains were also negatively associated with positive forecasted affect but only trait anxiety and depression were positively associated with blunted positive intensity bias.

2.4.3.1. Summary of findings. As noted above, the two studies highlight differences in associations between psychopathology and affective forecasts and intensity bias depending on the groups of daters and non-daters and the type of psychopathology. Nonetheless, dysphoria in particular was consistently associated with a stronger negative intensity bias and blunted positive intensity bias (Hoerger et al., 2012; Martin & Quirk, 2015).

3. Discussion

Considering the methodological heterogeneity when studying affective forecasting within the context of psychopathology, this scoping review attempted to summarize the evidence base that explores affective forecasting and the intensity bias in affective forecasting and their role in psychopathology. The studies were primarily divided into those that only had a forecast condition and those that included both a forecast and experience conditions, which determined the number of scores under consideration and whether an intensity bias score was calculated. The majority of studies investigated depression and anxiety related disorders and/or symptoms. Nonetheless, there were also studies on social anhedonia, autism traits, schizotypal traits, trauma symptoms, and OCD.

Types of tasks and hypothetical scenarios varied with a combination of pleasant, neutral, and unpleasant events, and those with social/interpersonal, evaluative, and monetary features. Predictions of emotional consequences were not limited to specific life events and the review also included studies on affective forecasting that measure general affect or mood and those of any design (both experimental and observational) to allow for a comprehensive assessment of the literature on this process within the context of the development and maintenance of psychopathology. Some studies focused only on negative affect whereas others included both negative and positive affect ratings. The majority of the evidence supports an association between severity of psychopathology and affective forecasts, with notable exceptions. These findings are discussed and contextualized within the scope of methodology and conceptualization of affective forecasting.

The operationalization of affective forecasting varied across studies. Although traditionally in social psychology, specific life events (personal or public) or laboratory tasks are used to assess affective forecasting (e.g., Buehler & McFarland, 2001; Lench et al., 2019), six of the studies included in this scoping review used general affect or mood measures not particular to a specific future event or decision (Mathersal & Ruscio, 2019; Pan et al., 2023; Thompson et al., 2017; Wenze et al., 2012; Wenze & Gunthert, 2018; Zetsche et al., 2019). This variation in operationalization maps onto the modes of future thinking in the taxonomy laid out by Szpunar et al. (2014). Future thinking can range from episodic ("specific autobiographical future event") to semantic ("non-specific autobiographical state") (Szpunar et al., 2014) and similarly affective forecasts can range in specificity across such a dimension. Nonetheless, it will be important to consider how the level of specificity plays a role in the intensity of forecasted affect and intensity bias. Research shows that the specific features of emotions being forecasted influence the degree of bias in those forecasts (Lench et al., 2019). That is, predicting the emotional consequences of a specific event (the intensity of possible emotions one could feel as a result of an event) differs from predictions about the impact that event could have on one's overall/general mood state (Lench et al., 2019). Therefore, these variations should be systematically investigated in future research, and researchers are encouraged to consider the features and purpose of the future emotion under contemplation.

Whether specific events or general affect was measured, studies reviewed assessed forecasted and experienced affect using subjective

rating scales, consistent with most studies in this area. In studies that examined only the intensity of forecasted affect in relation to psychopathology, authors were able to describe the degree of negativity and positivity of emotional predictions as a function of psychopathology but could not address an intensity bias per se. From those studies, higher trauma, hyperarousal, and social anxiety symptoms were associated with more intense negative affective forecasts (Anderl et al. (2022); Arditte Hall et al., 2018, Arditte Hall et al., 2020; Pan et al., 2023; Rizeq & McCann, 2019). In Pan et al. (2023) blunted – lower – positive affective forecasts were also associated with higher hyperarousal symptoms. When examining dysphoria and social anhedonia blunted positive forecasted affect was associated with more severe psychopathology in these domains but no significant association was found with forecasted negative affect (Marroquin et al., 2013; Marroquín & Nolen-Hoeksema, 2015; Zhang et al., 2020). On the other hand, Ji and MacLeod (2023) reported an opposite pattern with a non-significant association with forecasted positive affect and a significant association with more intense forecasted negative affect. In relation to schizotypal traits and schizophrenia, associations varied based on the domain (see Zhang et al., 2022; Zhang et al., 2023). Notably, higher symptoms of disorganization and diagnosed schizophrenia as compared to matched controls were both associated with lower forecasted positive affect for future negative social events (Zhang et al., 2023). On the other hand, total schizotypal traits and interpersonal features were associated with lower forecasted positive affect in relation to positive social events and positive social and non-social events, respectively (Zhang et al., 2022, 2023). Taken together, most studies point in the direction of increased negativity and decreased positivity in affective forecasts within the context of various psychopathology.

Research that was able to speak to an intensity bias used forecast and experience conditions and scores. Most studies, except for one (Hezel et al., 2019), reported on significant associations between the severity of psychopathology and an intensity bias, using either difference scores or covarying for experienced affect in a regression or ANCOVA models. This means that people with various types and degrees of psychopathology are vulnerable to a more severe negative and/or blunted positive intensity bias (Arditte Hall et al., 2018; Dev et al., 2023; Hoerger et al., 2012; Horne et al., 2020; Martin & Quirk, 2015; Mathersul & Ruscio, 2020; Moore et al., 2019; Wenze et al., 2012; Zetsche et al., 2019). Nonetheless, the results in some of these studies varied across types of psychopathology, conditions, and intensity bias scores. For example, when controlling for mood symptoms, anxiety symptoms were not significantly associated with blunted affective forecasts or intensity bias (Wenze et al., 2012). In Moore et al. (2019), although higher social anhedonia was associated with higher intensity of forecasted and experienced negative affect separately, it was not significantly associated with a negative intensity bias but was significantly associated with a blunted positive intensity bias. Further, in neutral social conditions, as opposed to an unpleasant social condition, the association between social anxiety, depression and trait anxiety symptoms with a negative intensity bias was not significant (Arditte Hall et al., 2018; Dev et al., 2023). This finding suggests that the unpleasantness or negativity of a condition in part elicits a susceptibility to a negative intensity bias in affective forecasting. This follows from research that shows that the characteristics of an event impact on whether and how one over or underestimates affect (Buechel, Zhang, & Morewedge, 2017).

When using the different approaches to test the intensity bias, the results remained the same in Zetsche et al. (2019), whereas in Wenze et al. (2012), the results changed depending on the approach used. In a later study, the intensity bias, based on difference score, did not predict change in levels of psychopathology (Wenze & Gunthert, 2018). There is an important methodological consideration regarding the different approaches to inferring and utilising an intensity bias score in affective forecasting. Difference scores, although indicating over or underestimation, do not capture uniqueness in forecasting per se, but a mere difference between experienced and forecasted affect that depends on ratings on both of these domains. That is, a two-point difference score could represent a forecast score of 10 and an experienced score of 8 or a forecast score of 12 and an experienced score of 10, but it does not tell us about how individuals who forecast a 12 versus 10 differ. Related to this, an intensity bias of +6 indicates a greater intensity bias than an intensity bias of +4. However, this difference could be due to variation in experienced affect rather than forecasted affect, considering that two people can forecast an intensity of 10 and report an experienced intensity of four and six, respectively. This follows from work showing that changes in level of intensity bias in affective forecasting can be due to variation in experienced affect rather than forecasted affect (Charpentier, De Neve, Li, Roiser, & Sharot, 2016). On the other hand, when using forecasted affect as a predictor or outcome in a model while controlling for experienced affect, one is better able to capture the unique variance in this construct and examine its respective association with psychopathology, differentiating those based on their forecasted affect score.

A difference score may well be suitable for demonstrating and characterising the degree of intensity bias, but it may fall short when the purpose is to investigate the role of affective forecasts in psychopathology. This distinction is then important when researchers are interested in the implication of affective forecasts specifically on decision making and behaviour, especially if one hopes to estimate the likelihood of a particular decision. The utility of using affective forecasts in predicting people's choices has been shown experimentally (Mellers, Schwartz, & Ritov, 1999). The differentiation between experienced and forecasted affect is further supported in studies that show the unique predictive effect of forecasted affect, as compared to experienced affect, on goal-directed behaviour and behavioural expectations (Brown & McConnell, 2011; Richard, van der Pligt, & de Vries, 1996), wellbeing outcomes (Buchanan, Buchanan, & Kadey, 2019), and depression diagnosis (Zetsche et al., 2019). Taken together, the evidence, although still growing, points to the importance of considering affective forecasting as a unique aspect of information processing, especially as it relates to psychopathology.

Recent evidence that points to the differentiation between reporting on one's forecasted versus experienced affect comes from new preliminary physiological data based on autonomic responses that shows that the process of affective forecasting is to an extent distinct from an experienced event, concluding that biases in affective forecasting cannot solely be a function of emotional responses induced by mental simulation of future events (Loisel-fleuriot et al., 2023). It is suspected that the process of predicting future emotional reactions relies more heavily on cognitive processing than experiential influences that are more characteristic of an experienced event. This is also consistent with affective forecasting being susceptible to cognitive biases such as focalism and immune neglect (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2006; Wilson & Gilbert, 2005, 2013). Once the degree of average bias is determined, affective forecasts can be meaningfully used in estimating actual reactions. This information has clinical utility as it can help clinicians estimate how one would potentially react to an event when it takes place offering a window to individuals' in the moment subjective experiences.

3.1. Methodological implications and recommendations

To summarize, there's key takeaways that can inform research on affective forecasting, particularly in relation to the methods of choice. First, a clear operationalization of affective forecasting, including the nature and valence of the emotion being forecasted and whether it is in relation to specific life events or general mood/affect should be provided. Second, when using hypothetical or real-life events, defining those events on relevant dimensions will also be important in order to allow comparisons and contextualization within the broader literature. Those dimensions can be rated on valence (pleasantness) and on interpersonal or academic or evaluative features, and/or other relevant domains. Third, consistency in terminology and distinction between

intensity bias and accuracy is recommended. That is, bias is characterized by the direction and degree of the difference between the forecasted and experienced affect whereas accuracy refers to the absolute difference. Fourth, when researchers are interested in the intensity bias, using difference scores to characterize the bias is certainly appropriate and makes for a simple demonstration of the degree and direction of the bias. Nonetheless, as discussed above, when researchers are interested in the association of the intensity bias with psychopathology, it is best that experienced affect score is used as a covariate in the model. This approach allows us to disentangle the unique effects of forecasted affect, while controlling for the level of experienced affect. Otherwise, we would be unable to tell whether the effect is driven by forecasted or experienced affect, and their relative contribution, from a difference score.

3.2. Psychopathology specific implications

It is challenging at this stage to draw overall conclusions about the specific nature of the association between affective forecasting and psychopathology, especially considering the methodological differences and the variety of psychopathology domains examined. Nonetheless, the are some noteworthy observations that can inform future research in this area. There are two overarching identified difficulties with the intensity of affective forecasts within the context of affective psychopathology: 1) highly intense negative affective forecasts and a negative intensity bias and 2) blunted positive affective forecasts and a blunted positive intensity bias. The negativity of affective forecasts and intensity bias seems nondiscriminatory when it comes to its association with psychopathology, meaning we are likely to see increased negativity in emotional predictions and overestimations within the context of various mental health disorders. This is consistent with our understanding of hopelessness in depression and threat expectations and worries in anxiety. Blunted positivity in affective forecasts and intensity bias on the other hand appears to be more consistently seen with dysphoria and anhedonia, which are features commonly seen with depression related disorders. This finding is in part consistent with the view that individuals with depression and dysphoria show difficulties imagining future positive events (for review see: Moustafa et al., 2018), which may interfere with their estimations of positive emotional consequences of those events.

3.3. Future directions

It is possible that there is an adaptive component to over or underestimating future affect. However, it is also clear that affective forecasts are linked with psychopathology with implications for various outcomes. It will be important for future work on affective forecasting to estimate healthy from debilitating levels of affective forecasts in order to optimize the amount of information researchers and clinicians can infer from these predictions and possibly identify areas for intervention. Several studies concluded that affective forecasting should be considered in further study as possible precipitating and/or maintaining factors for psychopathology and important target for intervention (e.g., Glenn et al., 2019; Rizeq & McCann, 2019; Zetsche et al., 2019). This is consistent with models of psychopathology that postulate that a negative view of the future is not only a symptom but can precipitate psychopathology (e.g., depression; Roepke & Seligman, 2016). To do so, we need to design studies that would allow us to manipulate affective forecasts (e.g., Lench et al., 2019) and assess its influence on change in symptoms of psychopathology. This line of work can advance the evidence base for active ingredients within psychotherapies that already incorporate techniques that require imagination and mental simulation, prospection, goal-setting, and estimation of emotional consequences (e.g., Beck & Haigh, 2014; Marsay, Scioli, & Omar, 2018; Oddli, McLeod, Nissen-Lie, Rønnestad, & Halvorsen, 2021; Vilhauer et al., 2012).

There is a notable gap in this research across childhood and adolescence, despite developmental work showing a negative intensity bias in a sample of healthy preschool children as young as four and five years (Gautam et al., 2017). A small-scale study with 33 youth with OCD also characterized affective forecasting errors in this sample and the association with symptomatology and treatment outcome, albeit limited in its conclusions with the lack of control group (Guzick, Reid, Balkhi, Geffken, & McNamara, 2020). Affective forecasting is based on the ability to mentally simulate situations and consequences and a degree of emotional understanding and awareness, all of which show significant developments by age 5 (Lagattuta, 2014; McCormack & Atance, 2011; Payne, Taylor, Hayne, & Scarf, 2015; Suddendorf & Redshaw, 2013). Therefore, this remains a promising research area for future clinical developmental work, particularly in explicating its role in models of information processing mechanisms in developmental psychopathology.

The extent to which affective forecasts can be used to estimate decision making impairments within the context of psychopathology is another direction for future research. These effects may depend on the future events and decisions under consideration. This brings into attention another future direction for research; generating a list of life events that range in frequency of occurrence and importance and in emotional valence (both positive and negative) can help standardize and advance research in this area. Finally, a key direction for this work should include the examination of diversity and culture-related issues that may shape the events and decisions in question as well as estimations of future emotional reactions. Indeed, all the studies included were conducted across five countries, with more than half of the studies included conducted in the USA alone.

3.4. Limitations

The aim of the scoping review is descriptive, and no inference can be made about the association between affective forecasting and psychopathology beyond the summary and integration of findings. The quality of the studies remains to be appraised in future systematic reviews on the topic, as this was outside the scope of the current review. Further, the limitation of the search only to studies published in English may have impacted the diversity of the evidence reviewed and included in this review.

3.5. Conclusion

Just as our sense of self is shaped by our memory of the past and experience at present, it is also reliant on our outlook for the future. Affective forecasting may offer psychological research a window from which to elucidate when the prospect of future events is exciting for some and debilitating for others and how to intervene. In conclusion, it remains that affective forecasting is an integral part of broader future thinking that can expose important directions for both diagnostic and intervention efforts, particularly for those with emotional disorders.

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Contributors

JR conceptualized and designed the study, wrote the protocol, conducted the literature searches, data charting, summary, and synthesis. JR wrote the manuscript.

Declaration of competing interest

No conflicts of interest to declare.

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Appendix A. Supplementary data

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