**A systematic review of the relationship between generic and specific metacognitive beliefs**

**and emotion dysregulation: a metacognitive model of emotion dysregulation**

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**ABSTRACT**

**Background**: Although a probable association between metacognitive beliefs (also termed ‘metacognitions’) and emotion dysregulation has been suggested in the literature, the evidence is still sparse and inconclusive. The current study aims to present a comprehensive evaluation of the literature examining the association between metacognitive beliefs and emotion dysregulation.

**Methods:** In accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria, a search was conducted on PubMed and Ebsco. A manual search of reference lists was also run. Search terms were ‘“metacognitions/metacognitive beliefs/positive metacognitive beliefs/negative metacognitive beliefs/cognitive self-consciousness/ beliefs about the need to control thoughts/cognitive confidence/negative beliefs about thoughts concerning uncontrollability and danger/AND difficulties emotion regulation/emotion dysregulation”.

**Results:** A total of 19 studies met the inclusion criteria. In both non-clinical and clinical populations a higher endorsement of dysfunctional metacognitive beliefs was found to be associated with emotion dysregulation, and *vice-versa*.

**Conclusions:** A higher endorsement of metacognitive beliefs may be associated, either directly or via maladaptive forms of mental control (e.g., worry, rumination, suppression), to emotion dysregulation. Metacognitive beliefs could be the potential therapeutic target in clinical interventions aimed at reducing emotion regulation difficulties.

**Keywords**:metacognitions, metacognitive beliefs, emotion dysregulation, emotion regulation strategies, repetitive negative thinking, expressive suppression.

**1. INTRODUCTION**

In the early 1990s Wells and Matthews (1994, 1996) outlined the Self-Regulatory Executive Function (S-REF) model of psychological disorders integrating information processing research with Beck’s schema theory (Beck, 1979). The S-REF model differs from standard cognitive theories (Beck, 1979; Ellis and Whiteley, 1979) by emphasizing the importance of how people think about and regulate their own internal states (i.e., cognitions, thoughts, emotions), rather than the content and meaning of thoughts (Capobianco and Nodahl, 2021; Wells, 2009). The S-REF model proposed that psychological disorders were linked to maladaptive metacognitive beliefs i.e., beliefs that individuals hold about their own internal states (i.e., cognitions, thoughts, emotions) and about coping strategies that impact on it (Wells and Matthews, 1994,1996). Metacognitive beliefs (also termed ‘metacognitions’) can be broadly divided into two main typologies (Spada et al., 2015; Wells and Matthews, 1994, 1996): (1) generic metacognitive beliefs about internal cognitive-affective experiences and their significance (e.g., “I need to control my thoughts at all times”; “I need to feel upset sometimes in order to function well”); (2) metacognitive beliefs about cognitive-affective self-regulatory strategies, that in turn are divided into two main subtypes: i.e., positive metacognitive beliefs pertaining to the benefits of engaging in specific strategies to control cognitive-affective state (e.g., “If I worry I will be prepared”), and negative metacognitive beliefs about the uncontrollability and danger of strategies to control cognitive-affective states and the detrimental derivates of employing such strategies (e.g., “I cannot control my ruminative thoughts”; “Feeling upset is uncontrollable”); consistently in this field of research, specific metacognitive beliefs related to problematic behaviors (e.g., alcohol use, smoking, gambling, binge eating) have been also identified (Hamonniere & Varescon, 2018; Palmieri et al., 2023a). Research undertaken over the last fifteen years has underlined the possible role of metacognitive beliefs as etiological and maintenance mechanisms of psychological distress and a wide range of psychological disorders including mood disorders, anxiety disorders, Obsessive–Compulsive Disorder, Stress-Related Disorder, Eating Disorders, Psychotic Disorders, the spectrum of addictive behaviours, Personality Disorders (Hamonniere and Varescon, 2018; Lenzo et al., 2020; Mansueto et al., 2016; Mansueto et al., 2019; Palmieri et al., 2021; Palmieri et al., 2023a; Rogier et al., 2021; Sellers et al., 2017; Spada et al., 2015; Spada et al., 2021; Sun et al., 2017).

Within this framework, Wells (2000) suggested that given that metacognitive beliefs fulfil an executive function with regards to cognitive processing, it is likely that they may be associated with emotion dysregulation. Emotion dysregulation is a multifaceted construct involving maladaptive ways of responding to one’s emotions in an attempt to regulate emotional states, such as: (a) lack of emotional awareness, clarity, and acceptance; (b) lack of behavioral control in the context of intense emotions; (c) unwillingness to pursue meaningful activities in the context of emotional distress; and (d) inflexible use of adaptive strategies to modulate (vs. eliminate) the intensity and/or duration of emotional experiences (Gratz and Roemer, 2004). Emotion dysregulation is characterized by frequent categorical shifts, high affective intensity, rapid emotional rise times, slow rates of return to emotional baseline, excessive reactivity to psychosocial cues, random chaotic or rapidly-cycling fluctuation in affect, and histrionic reporting of affective experience (Koenigsberg, 2010).

In the last few decades, there have been several studies (Dragan et al., 2015; Manser et al., 2012; Mansueto et al., 2022; Palmieri et al., 2023b; Salguero et al., 2019) that have utilised the S-REF model as a theoretical framework (Wells and Matthews, 1994, 1996), and which have explored whether metacognitive beliefs may be associated with emotion dysregulation. It has been argued that metacognitive beliefs may be associated with emotion dysregulation directly or via maladaptive forms of maladaptive mental control (e.g., worry, rumination and thought suppression) (Mansueto et al., 2022; Manser et al., 2012; D’Agostino et al., 2017; Palmieri et al., 2023b). Given that metacognitive beliefs are different from each other (Wells and Cartwright-Hatton, 2004), it is likely that specific metacognitive beliefs may be more strongly related to emotion dysregulation (Mansueto et al., 2022; Palmieri et al., 2023b; Sun et al., 2017). Some evidence suggests that negative metacognitive beliefs about thoughts concerning uncontrollability and danger (e.g., “When I start worrying I cannot stop”) and beliefs about the need to control thoughts (e.g., “I should be in control of my thoughts all of the time”) are more likely to be an antecedent of emotion dysregulation than other metacognitive beliefs (Mansueto et al., 2022; Palmieri et al., 2023; Sun et al., 2017). However, although some studies have demonstrated significant associations between a higher endorsement of metacognitive beliefs and emotion dysregulation (Manser et al., 2012; Mansueto et al., 2022; Palmieri et al., 2023b), there have not been a synthesis of all the studies to date yet. This absence of a systematic review of the literature regarding the association between metacognitive beliefs and emotion dysregulation prevents us from drawing a conclusion on the possible role of metacognitive beliefs as an underlying maintenance mechanism of emotion dysregulation. A comprehensive review and synthesis of knowledge regarding the association between metacognitive beliefs and emotion dysregulation would offer an understanding of whether metacognitive beliefs are a suitable therapeutic target towards reduction in emotion regulation difficulties (Manser et al., 2012; Mansueto et al., 2022; Ruggiero et al., 2018; Wells, 2000). Therefore, the aim of the present systematic review is to carry out a comprehensive evaluation of literature examining the association between metacognitive beliefs and emotion dysregulation. The present systematic review aimed to explore: (a) the relationship between metacognitive beliefs and emotion dysregulation in clinical and non-clinical samples; (b) the relationship between generic metacognitive beliefs about cognitive and/or affective experiences and emotion dysregulation; (c) the relationship between metacognitive beliefs about cognitive-affective self-regulatory strategies (i.e., positive metacognitive beliefs about the benefits of engaging in specific strategies to control cognitive-affective state, negative metacognitive beliefs about the uncontrollability and danger of strategies to control cognitive-affective states, and the detrimental derivates of employing such strategies) and emotion dysregulation.

**2. METHOD**

**2.1 Study selection**

Study selection methodology has been reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021).

**2.2 Eligibility criteria**

The following inclusion criteria were applied to the literature search: (a) English-language articles published in peer-reviewed journals; (b) studies that have used measures of emotion (dys)regulation and that have evaluated metacognitive beliefs (Wells and Matthews, 1996); and (c) research using a case–control design, cross-sectional studies, prospective cohort studies, experimental studies. There were no restrictions on the location where the studies were conducted to allow the inclusion of as many studies as feasible. Study exclusion criteria comprised: (a) studies that have not used measures of emotion (dys)regulation; (b) studies on metacognitive beliefs not specifically referring to the S-REF model (Wells and Matthews, 1996); (c) non-English studies; (d) meta-analyses and systematic review; (e) grey literature; (f) studies on participants with a diagnosis of neurological and/or neurocognitive organic impairment and; (g) qualitative studies; and (h) studies including special populations (e.g., veterans, pregnant women).

**2.3 Information sources and search strategy**

A comprehensive search was conducted on PubMed, EBSCOhost (which includes the follow databases: APA PsycInfo, APA PsycArticles, PSYNDEX Literature with PSYNDEX Tests, MEDLINE; ERIC), and Web of Science. Appendix 1 shows the search strategy used. The search terms used were: “metacognitions/metacognitive beliefs/positive metacognitive beliefs/ negative metacognitive beliefs/cognitive self-consciousness/beliefs about the need to control thoughts/ cognitive confidence/negative beliefs about thoughts concerning uncontrollability and danger/AND difficulties emotion regulation/emotion dysregulation”. The search strategies used to identify articles related to metacognitive beliefs (Wells and Matthews, 1996) were defined according to the literature (Palmieri et al., 2021; Wells and Matthews, 1996; Wells and Cartwright-Hatton, 2004).

In addition, a manual search was performed of reference lists from existing reviews or meta-analyses and from the articles retrieved. Experts in the field and authors of significant articles and abstracts were contacted, if needed. Moreover, there has been no restriction regarding the publication date of the articles. Initial searches were undertaken on 02 October 2022 and the last search was conducted on 30 May 2023. The protocol was registered in PROSPERO (CRD42023405968) and is available from: <https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42023405968>; the protocol is not published elsewhere.

**2.4 Selection process, data collection process and data items**

The eligibility of studies was assessed through the following procedure: title screening, abstract screening and full papers screening. Titles and abstracts were screened by two reviewers (A.J. and G.M.). Articles potentially relevant were retrieved in full. The two reviewers acted blindly and independently. No automation tools were used in the selection process. Disagreements were solved by consensus (intercoder reliability: Cohen's kappa coefficient = 0.85). For each included study, the following data were extracted: reference, study design, sample size, population, socio demographic data, metacognitive beliefs measures, emotion dysregulation measures, and main outcomes (i.e., metacognitive beliefs, emotion dysregulation), measures of effect size (i.e., standardized mean difference, correlations coefficients, beta coefficients, were considered for continuous data, and odds ratios were considered for dichotomous data).

When information was omitted, authors were contacted to retrieve missing data. In case of dupli­cate publications, only the one with the largest sample size was included. The following assumption was made, i.e., if not stated otherwise, participants were not considered to have a diagnosis of neurological and/or neurocognitive organic impairment.

**2.5 Assessment of risk of bias in individual studies**

According to previous studies (Mansueto et al., 2021; Palmieri et al., 2021) two researchers (G.M. and S.P.) independently rated each study according to the following criteria in order to determine its validity and the equivalent risk of bias: homogeneity of the sample with regard to the diagnosis, if existent; appropriateness of random allocation, if necessary; and presence of a comparator group, if applicable. Each criterion was assigned a rating of low, unclear, or high risk of bias. Studies were judged “unclear” in the event that the reporting of what happened in the study was not detailed enough to determine whether the risk of bias was either low or high. The two reviewers acted blindly and independently. Disagreements were solved by consensus (intercoder reliability: Cohen's kappa coefficient = 0.80).

**2.6 Quality assessment**

Included studies were qualitatively assessed by two independent investigators (G.M. and S.P.) using the Newcastle-Ottawa Scale (NOS) (Wells et al., 2010). The NOS tool includes 8 items addressing the appropriateness of 3 major areas: the selection of study sample, the comparability of study groups, and the ascertainment of either the exposure for case control studies or the outcome for cohort studies. Studies can be assigned a maximum of 10 stars, with a maximum of 5 stars for the Selection area, 2 stars for the Comparability area, and 3 stars for either the Outcome or the Exposure area (Wells et al., 2010). Further potential sources of bias or other methodological issues were also addressed. The two reviewers acted blindly and independently. Disagreements were solved by consensus (intercoder reliability: Cohen's kappa coefficient = 0.90).

**3. RESULTS**

**3.1 Study selection**

The search of PubMed, Ebsco and Web of Science databases and the manual search provided a total of 570 citations. Of these studies, 298 were not pertinent because they did not focus on the association between metacognition and emotion dysregulation. After adjusting for duplicates and re-viewing the abstracts, to exclude those that clearly did not meet the criteria (n = 16), 19 remained. Figure 1 illustrates the search and screening process.

All selected studies had a cross-sectional design. Six studies were conducted in Italy (Casale et al., 2016; Laghi et al., 2018; Mansueto et al., 2022; Palmieri et al., 2023; Rogier et al., 2022; Spada and Marino, 2017), six studies in Iran (Akbari, 2017; Akbari et al., 2021; Akbari et al., 2023; Mazloom et al., 2016; Mohammadkhani et al., 2020; Poormahdy et al., 2022), one study in United Kingdom (Manser, et al., 2012), one study in Poland (Dragan et al., 2015), one in the United States of America (Leahy et al., 2019), one study in Spain (Salguero et al., 2019), one study in Lebanon (Azzi et al., 2022), and one study in Canada (Deleurme et al., 2022).

Nine studies were run on non-clinical samples (i.e., university students, general population) (Akbari, 2017, Akbari et al., 2021; Akbari, 2023; Casale et al., 2016; Deleurme et al., 2022; Manser et al., 2012; Mansueto et al., 2022 study 1; Rogier et al., 2022; Salguero et al., 2019), seven studies on clinical samples (i.e., patients under psychotherapy, outpatients seeking psychological treatment, outpatients with eating disorders, participants with nicotine dependence, alcohol dependence inpatients, drinkers) (Azzi et al., 2022; Dragan et al., 2015; Leahy et al., 2019; Mansueto et al., 2022 study 2; Ottonello et al., 2019; Palmieri et al., 2023b; Poormahdy et al., 2022), and four studies were run on adolescent samples (Mazloom et al., 2016; Mohammadkhani et al., 2020; Laghi et al., 2018; Spada and Marino, 2017).

Metacognitive beliefs were measured with the Metacognitions Questionnaire Short Form-30 (Wells and Cartwright-Hatton, 2004) in twelve studies (Akbari, 2017; Akbari et al., 2021; Deleurme et al., 2022; Laghi et al., 2018; Leahy et al, 2019; Mansueto et al., 2022 study 1; Mansueto et al., 2022 study 2; Mazloom et al., 2016; Mohammadkhani et al., 2020; Palmieri et al., 2023; Salguero et al., 2019; Spada and Marino, 2017), with the Positive Alcohol Metacognitions Scale (Spada et al., 2008) and the Negative Alcohol Metacognitions scale (Spada et al., 2008) in three studies (Azzi et al., 2022; Dragan et al., 2015; Ottonello et al., 2019), with the Metacognitions about Smoking Questionnaire (Nikčević et al., 2015) in one study (Poormahdy et al., 2022), with the Metacognitions about Smartphone Use Questionnaire in one study (Akbari, 2023) with the Distraction Scale of the Online Cognition Scale (Davis et al., 2002) and the Schouten’s scale (Schouten et al., 2007) in one study (Casale et al., 2016), with the Beliefs about Emotions Questionnaire (Manser et al., 2012) in one study (Manser et al., 2012), and with the Emotion Beliefs Questionnaire (Becerra, 2020) in one study (Rogier et al., 2022). Emotion dysregulation was measured with the Difficulties in Emotion Regulation Scale (Gratz and Roemer, 2004) in eleven studies (Akbari, 2017; Casale et al., 2016; Dragan, 2015; Laghi et al., 2018; Mansueto et al., 2022 study 1; Mansueto et al., 2022 study 2; Mazloom et al., 2016; Ottonello et al., 2019; Palmieri et al., 2023b; Poormahdy et al., 2022; Salguero et al., 2019), with the Difficulties in Emotion Regulation Scale Short-Form (Kaufman et al., 2015) in one study (Ottonello et al., 2019), with the Emotion Regulation Questionnaire (Gross and John, 2003) in three studies (Akbari et al., 2021; Akbari et al., 2023; Azzi et al., 2022), with the Berkeley Expressivity Questionnaire (Gross and John, 1997) in one study (Deleurme et al., 2022), with the Borderline Symptom List (Bohus et al., 2007) in one study (Manser et al., 2012), with the Emotional Schema Scale-II (Leahy, 2002) in one study (Leahy et al., 2019), with the three-items subscale measuring “emotion regulation” drawn from the Social and Emotion Health Survey for secondary school students (Furlong et al. 2013) in one study (Spada & Marino, 2017), and with Cognitive Emotion Regulation Questionnaire (Garnefski et al., 2001) in one study (Mohammadkhani et al., 2020). Further details about the self-report scales of emotion dysregulation included in the present systematic review are reported in Appendix 2.

Table 1 reported a summary for study characteristic.

**3.2 Metacognitive beliefs and emotion dysregulation in non-clinical samples**

**3.2.1 Generic metacognitive beliefs about cognitive and/or affective experiences and emotion dysregulation in non-clinical samples**

Table 2 reports studies evaluating the association between generic metacognitive beliefs about cognitive and/or affective experiences and emotion dysregulation in non-clinical samples. The aforementioned studies showed statistically significant positive correlations between higher levels of dysfunctional metacognitive beliefs (i.e., MCQ-30 total score) (Akbari et al., 2017; Salguero et al., 2019), beliefs about the need to control thoughts (Mansueto et al., 2022), cognitive self-consciousness (Mansueto et al., 2022), cognitive confidence (Mansueto et al., 2022), metacognitive beliefs about emotions (Manser et al., 2012; Rogier et al., 2022), and emotion dysregulation (r values ranging from 0.16 to 0.54).

**3.2.2 Positive metacognitive beliefs about the benefits of engaging in specific strategies to control cognitive-affective state and emotion dysregulation in non-clinical samples**

Table 3 reports studies evaluating the association between positive metacognitive beliefs about the benefits of engaging in specific strategies to control cognitive-affective state and emotion dysregulation in non-clinical samples. The aforementioned studies showed statistically significant positive correlations between positive beliefs about worry (Mansueto et al., 2022), positive metacognitive beliefs about internet use (Casale et al., 2016), and emotion dysregulation (r values ranging from 0.20 to 0.31). Moreover, a higher endorsement of positive beliefs about worry has been found to be associated with sub-components of emotion dysregulation i.e., a greater expression of negative emotions and emotional reactions to experiences (r values ranging from 0.09 to 0.18), but not with a greater expression of positive emotions (Deleurme et al., 2022).

**3.2.3 Negative metacognitive beliefs about the uncontrollability and danger of strategies to control cognitive-affective states and the detrimental derivates of employing such strategies and emotion dysregulation in non-clinical samples**

Table 4 reports studies evaluating the association between negative metacognitive beliefs about the uncontrollability and danger of strategies to control cognitive-affective states and the detrimental derivates of employing such strategies and emotion dysregulation in non-clinical samples.A higher endorsement of negative beliefs about thoughts concerning uncontrollability and danger has been found to be significantly associated with emotion dysregulation (r=0.50) (Mansueto et al., 2022). Moreover, considering sub-components of emotion dysregulation, higher levels of negative beliefs about thoughts concerning uncontrollability were found to be statistically significantly positively associated with greater expression of negative emotions and emotional reactions to experiences (r values ranging from 0.12 to 0.38), but not with greater expression of positive emotions (Deleurme et al., 2022).

**3.3 Metacognitive beliefs and emotion dysregulation in clinical samples**

**3.3.1 Generic metacognitive beliefs about cognitive and/or affective experiences and emotion dysregulation in clinical samples**

Table 2 reports studies evaluating the association between generic metacognitive beliefs about cognitive and/or affective experiences and emotion dysregulation in clinical samples.The aforementioned studies showed: (a) statistically significant positive correlations between beliefs about the need to control thoughts and emotion dysregulation (r values ranging from 0.59 to 0.61), among outpatients seeking psychological treatment (Mansueto et al., 2022) and outpatients with eating disorders (Palmieri et al., 2023b); (b) statistically significant associations between cognitive self-consciousness and emotion dysregulation among outpatients seeking psychological treatment (r=0.16) (Mansueto et al., 2022) but not among outpatients with eating disorders (Palmieri et al., 2023); (c) statistically significant positive correlation between cognitive confidence and emotion dysregulation among outpatients seeking psychological treatment (r=0.31) (Mansueto et al., 2022), but not among outpatients with eating disorders (Palmieri et al., 2023). One study (Leahy et al., 2019), exploring the association between metacognitive beliefs and sub-components of emotion dysregulation among adult patients under psychotherapy, showed that higher levels of beliefs about need to control thoughts and cognitive self-consciousness were associated with poor acceptance own feelings (r values ranging from -0.46 to -0.12).

**3.3.2 Positive metacognitive beliefs about the benefits of engaging in specific strategies to control cognitive-affective state and emotion dysregulation in clinical samples**

Table 3 reports studies evaluating the association between positive metacognitive beliefs about the benefits of engaging in specific strategies to control cognitive-affective state and emotion dysregulation in clinical samples. The aforementioned studies showed statistically significant positive correlations between: (a) positive beliefs about worry and emotion dysregulation(r values ranging from 0.03 to 0.15) among outpatients seeking psychological treatment (Mansueto et al., 2022), and outpatients with eating disorders (Palmieri et al., 2023b); (b) metacognitive beliefs about alcohol use and emotion dysregulation (r values ranging from 0.36 to 0.39) among problem drinkers (Dragan, 2015) and alcohol dependence inpatients (Ottonello et al. 2019); (c) positive metacognitive beliefs about smoking and emotion dysregulation (r=0.41) among participants with nicotine dependence (Poormahdy et al., 2022). Studies exploring the association between specific metacognitive beliefs and sub-components of emotion dysregulation shown: (a) statically significant negative association between positive beliefs about worry and poor acceptance of own feeling (r=-0.21) among adult patients under psychotherapy (Leahy et al., 2019); (b) statistically significant positive correlations between positive metacognitive beliefs about alcohol use and non acceptance of emotional responses, difficulties engaging in goal-directed behaviour, impulse control difficulties, limited access to emotion regulation strategies, lack of emotional clarity (r values ranging from 0.27 to 0.33) among problem drinkers (Dragan, 2015).

**3.3.3 Negative metacognitive beliefs about the uncontrollability and danger of strategies to control cognitive-affective states and the detrimental derivates of employing such strategies and emotion dysregulation in clinical samples**

Table 4 reports studies evaluating the association between metacognitive beliefs about the uncontrollability and danger of strategies to control cognitive-affective states and the detrimental derivates of employing such strategies and emotion dysregulation in clinical samples. The aforementioned studies showed statically significant positive correlations between: (a) negative beliefs about thoughts concerning uncontrollability and danger and emotion dysregulation among outpatients seeking psychological treatment (r values ranging from 0.57 to 0.60) (Mansueto et al., 2022) and outpatients with eating disorders (Palmieri et al., 2023b); (b) negative metacognitive beliefs about alcohol use and emotion dysregulation (r values ranging from 0.24 to 0.41) among problem drinkers (Dragan, 2015) and alcohol dependence inpatients (Ottonello et al., 2019); (c) negative metacognitive beliefs about smoking and emotion dysregulation (r=0.26) among participants with nicotine dependence (Poormahdy et al., 2022).

Studies exploring the associations between specific metacognitive beliefs and sub-components of emotion dysregulation shown: (a) statistically significant negative correlation between negative beliefs about thoughts concerning uncontrollability and danger and poor acceptance of feelings (r=-0.21) among adult patients under psychotherapy (Leahy et al., 2019); (b) statistically significant positive correlations between negative metacognitive beliefs about alcohol use and non-acceptance of emotional responses, difficulties engaging in goal-directed behaviour, lack of emotional clarity (r values ranging form 0.08 to 0.17) among problem drinkers (Dragan, 2015); (c) no statistically significant associations between negative metacognitive beliefs about alcohol use and impulse, lack of emotional awareness, and limited access to emotion regulation strategies, among problem drinkers (Dragan, 2015).

**3.4 Direction of the association between metacognitive beliefs and emotion dysregulation**

**3.4.1 Metacognitive beliefs and emotion dysregulation**

In non-clinical samples (i.e., general population) both generic metacognitive beliefs about cognitive and/or affective experiences and negative metacognitive beliefs about the uncontrollability and danger of strategies to control cognitive-affective states and the detrimental derivates of employing such strategies,were found to be statically significant associated with emotion dysregulation: (a) beliefs about the need to control thoughts were found to be statically significant positively associated with emotion dysregulation (*β* = 0.17) (Mansueto et al., 2022); (b) cognitive self-consciousness was found to be significant negatively associated with a emotion dysregulation (*β* = -0.20) (Mansueto et al., 2022); (c) negative beliefs about thoughts concerning uncontrollability and danger were found to be statically significant positively associated with emotion dysregulation (*β* = 0.18, p<0.001) (Mansueto et al., 2022).

In clinical samples (i.e., outpatients seeking psychological treatments, outpatients with eating disorders) generic metacognitive beliefs about cognitive and/or affective experiences were found to be statically significant associated with emotion dysregulation: (a) beliefs about the need to control thoughts were found to be statically s positively associated with emotion dysregulation (*β values ranging from* 0.35 to 0.22) among outpatients seeking psychological treatments (Mansueto et al., 2022) and outpatients with eating disorders (Palmieri et al., 2023b); (b) cognitive self-consciousness was found to be statically negatively associated with emotion dysregulation (*β* = -0.22) among outpatients seeking psychological treatments (Mansueto et al., 2022).

**3.4.2 Emotion dysregulation and metacognitive beliefs**

In non-clinical samples (i.e., general population; university students) emotion dysregulation (i.e., DERS total score) was found to be a statically significant associated with an endorsement of: (a) generic metacognitive beliefs about cognitive and/or affective experiences (i.e., metacognitive beliefs about emotional responses) (*β* =0.42) (Rogier et al., 2022); (b) positive metacognitive beliefs about the benefits of engaging in specific strategies to control cognitive-affective state (i.e., positive beliefs about worry, positive metacognitive beliefs about internet use) (*β* values ranging from 0.04 to 0.75) (Akbari, 2017; Casale et al., 2022; Salguero et al., 2019).

In clinical samples (i.e., problem alcohol drinkers, participants with nicotine dependence) emotion dysregulation (i.e., DERS total score) was found to be a statically significant associated with an endorsement of: (a) positive metacognitive beliefs about the benefits of engaging in specific strategies to control cognitive-affective state (i.e.,positive metacognitive beliefs about alcohol use, positive metacognitive beliefs about smoking) (*β* values ranging from 0.35 to 0.93) (Dragan, 2015; Poormahdy et al., 2022); (b) negative metacognitive beliefs about the uncontrollability and danger of strategies to control cognitive-affective states and the detrimental derivates of employing such strategies (i.e., negative metacognitive beliefs about alcohol use, negative metacognitive beliefs about smoking) (*β* values ranging from 0.14 to 0.38) (Dragan, 2015; Poormahdy et al., 2022).

**3.5 Metacognitive beliefs and maladaptive forms of mental control hindering the process of emotional regulation**

**3.5.1 Metacognitive beliefs and maladaptive forms of mental control hindering the process of emotional regulation in non-clinical samples**

Two studies explored the associations between metacognitive beliefs and maladaptive forms of mental control i.e., cognitive reappraisal, expressive suppression, repetitive negative thinking (i.e., rumination and worry) in non-clinical samples (i.e., general population) (Akbari et al., 2021; Mansueto et al., 2022).

As regard the associations between generic metacognitive beliefs about cognitive and/or affective experiences and emotion regulation strategies, literature showed that: (a) a higher endorsement of beliefs about the need to control thoughts and a higher endorsement of cognitive self-consciousness are associated with low use of cognitive reappraisal (r values ranging from -0.23 to -0.16) (Akbari et al., 2021); (b) a higher endorsement of cognitive confidence is not associated with low us of cognitive reappraisal (Akbari et al., 2021); (c)  a higher endorsement of beliefs about the need to control thoughts, cognitive self-consciousness, and cognitive confidence are associated with higher expressive suppression (r values ranging from 0.15 to 0.29) (Akbari et al., 2021); (d) rumination mediates the association between metacognitive beliefs (i.e., cognitive confidence, cognitive self-consciousness) and emotion dysregulation (Mansueto et al., 2022); (e) worry does not mediate the association between generic metacognitive beliefs about cognitive and/or affective experiences and emotion dysregulation (Mansueto et al., 2022).

As what concern the associations between positive/negative metacognitive beliefs about cognitive-affective self-regulatory strategies and emotion regulation strategies, literature showed that: (a) a higher endorsement of positive beliefs about worry is significantly associated with cognitive reappraisal (r = 0.18) but not with expressive suppression (Akbari et al., 2021); (b) higher endorsement of positive metacognitive beliefs about internet use is associated with expressive suppression (r=0.12) and cognitive reappraisal (r=0.09); (c) a higher endorsement of negative beliefs about thoughts concerning uncontrollability and danger is significantly associated with low use of cognitive reappraisal (r=-0.29) and higher expressive suppression (r=0.31) (Akbari et al., 2021); (d) a higher endorsement of negative metacognitive beliefs about smartphone use is significantly associated with low use of cognitive reappraisal (r=-0.10) but not with expressive suppression (Akbari et al., 2023); (d) rumination mediates the association between metacognitive beliefs (i.e., negative beliefs about thoughts concerning uncontrollability and danger) and emotion dysregulation; (b) worry does not mediate the association between positive/negative metacognitive beliefs about cognitive-affective self-regulatory strategies and emotion dysregulation (Mansueto et al., 2022).

**3.5.2 Metacognitive beliefs and maladaptive forms of mental control hindering the process of emotional regulation in clinical samples**

Two studies explored the associations between metacognitive beliefs and maladaptive forms of mental control i.e. repetitive negative thinking (i.e., rumination and worry) in clinical sample (i.e., alcohol drinkers, outpatients seeking psychological treatments) **(**Azzi et al., 2022; Mansueto et al., 2022).

As regard the associations between generic metacognitive beliefs about cognitive and/or affective experiences and maladaptive forms of mental control, rumination was found to play a mediating role in the association between beliefs about the need to control thoughts and emotion dysregulation, among outpatients seeking psychological treatments (Mansueto et al., 2022).

As regard the associations between positive/negative metacognitive beliefs about cognitive-affective self-regulatory strategies and maladaptive forms of mental control, literature showed that: (a) a higher endorsement of positive metacognitive beliefs about alcohol use is associated with cognitive reappraisal and expressive suppression (r values ranging from 0.13 to 0.29) among alcohol drinkers (Azzi et al., 2022); (b) a higher endorsement of negative metacognitive beliefs about alcohol use is associated with expressive suppression (r values ranging from 0.12 to 0.20) but not with cognitive reappraisal among alcohol drinkers (Azzi et al., 2022); (c) rumination play a mediating role in the association between negative beliefs about thoughts concerning uncontrollability and danger and emotion dysregulation among outpatients seeking psychological treatments (Mansueto et al., 2022); (d) worry play a mediating role in the association between positive beliefs about the usefulness of worry, negative beliefs about thoughts concerning uncontrollability and danger, and emotion dysregulation among outpatients seeking psychological treatments (Mansueto et al., 2022).

**3.6 Metacognitive beliefs and emotion dysregulation in adolescent samples**

Four studies explored the association between metacognitive beliefs and emotion dysregulation among adolescents (Laghi et al., 2018; Mazloom et al., 2016; Mohammadkhani et al., 2020; Spada & Marino, 2017).A higher endorsement on metacognitive beliefs (i.e., MCQ-30 total score) was found to be significantly associated with emotion dysregulation (r =0.37, p<0.01) (Mazloom et al., 2016; Mohammadkhani et al., 2020). Considering specific metacognitive beliefs: (a) positive metacognitive beliefs have been found to be associated with difficulties in emotion regulation (r values ranging from 0.22 to 0.32, p<0.001) (Spada & Marino, 2017; Laghi et al., 2018); (b) both positive (r=0.32, p<001) (Spada & Marino, 2017) and negative (r=-0.08, p<0.01) (Laghi et al., 2018) associations have been found between self-consciousness and emotion dysregulation; and (c) as concerns the association between negative beliefs, need to control thoughts, cognitive confidence and emotion dysregulation, either significant (r values ranging from 0.28 to 0.56, p<0.001) (Laghi et al., 2018) and not significant (Spada & Marino, 2017) associations were found.

**3.7 Study quality**

19 of the studies fulfilled all the Newcastle–Ottawa quality criteria. Of the 19 studies,

one study scored 3/10, five studies scored 4/10, eleven studies scored 5/10, two studies scored 7/10. Further details regarding study quality can be found in Table 5.

**4. DISCUSSION**

Since the early 2000s, three main lines of research have explored the association between metacognitive beliefs and emotion dysregulation in non-clinical samples (i.e., university students and general population) and in clinical samples (i.e., outpatients with a diagnosis of personality disorders, mood and anxiety disorders, obsessive-compulsive disorder, eating disorders, problem drinkers, alcohol and nicotine dependence, and patients under psychotherapy): (1) the first line of research has explored the association between generic metacognitive beliefs about cognitive affective experiences (i.e., beliefs about the need to control thoughts, cognitive competence, cognitive self-consciousness, cognitive confidence, metacognitive beliefs about emotions) and emotion dysregulation; (2) the second line of research has investigated the association between metacognitive beliefs about cognitive-affective self-regulatory strategies and emotion dysregulation; consistently in this field of research studies have explored two main typologies of metacognitive beliefs i.e., positive metacognitive beliefs pertaining to the benefits of engaging in specific strategies to control cognitive-affective state (i.e., positive beliefs about worry, positive metacognitive beliefs about internet use/smartphone use, positive metacognitive beliefs about alcohol use, positive metacognitive beliefs about smoking), and negative metacognitive beliefs about the uncontrollability and danger of strategies to control cognitive-affective states and the detrimental derivates of employing such strategies (i.e., negative beliefs about thoughts concerning uncontrollability and danger, negative metacognitive beliefs about alcohol use, negative metacognitive beliefs about smoking, negative metacognitive beliefs about smartphone use); and (3) the third line of research has explored the association between metacognitive beliefs and maladaptive forms of mental controls (i.e., worry, rumination, cognitive reappraisal, expressive suppression) hindering the process of emotion regulation. Across non-clinical and clinical samples among adult populations, significant associations between a higher endorsement of metacognitive beliefs and emotion dysregulation, as well as, between metacognitive beliefs and maladaptive forms of mental controls have been reported. In further detail, literature suggests that, in adult populations, in non-clinical and clinical samples:

1. A higher endorsement of generic metacognitive beliefs about cognitive and/or affective experiences, specifically beliefs about the need to control thoughts, and a higher endorsement of metacognitive beliefs about cognitive-affective self-regulatory strategies, specifically negative beliefs about thoughts concerning uncontrollability, may be associated with emotion dysregulation (Mansueto et al., 2022; Palmieri et al., 2023b). Beliefs about the need to control thoughts (i.e., the extent to which a person believes that certain types of thoughts need to be suppressed, e.g., “I should be in control of my thoughts all of the time”) may be associated with a decreased ability to shift between mental sets (Kraft et al., 2017) leading to a cognitive ‘gridlock’ and excessive self-focussed attention (Spada et al., 2008). This could explain why participants who endorse high levels of beliefs about the need to control thoughts may experience difficulties to switching to more adaptive emotion regulation strategies (Mansueto et al., 2022). The association between negative beliefs about thoughts concerning uncontrollability (i.e., the extent to which a person believes that perseverative thinking is uncontrollable and dangerous, e.g., ‘‘When I start worrying I cannot stop’’; “If I continue to ruminate I will lose my mind”) and emotion dysregulation confirm the role of negative metacognitive beliefs as a potential maintenance factor of emotional diseases (Sun et al., 2017);
2. A higher endorsement of unhelpful metacognitive beliefs (i.e., generic metacognitive beliefs about cognitive and/or affective experiences and metacognitive beliefs about cognitive-affective self-regulatory strategies) may be associated with the use of maladaptive forms of mental control (i.e. low use of cognitive reappraisal, higher levels of expressive suppression, higher levels of repetitive negative thinking) which in turn: (a) may strengthen dysfunctional metacognitive beliefs resulting in a possible vicious cycle (Akbari et al., 2023; Azzi et al., 2022; Mansueto et al., 2022; Palmieri et al., 2023b); and (b) may hinder the process of emotional regulation (Balzarotti et al., 2000; Gross, 1998; Gross, 2001; Mansueto et al., 2022; Palmieri et al., 2023b; Sheppes et al., 2015). These findings are consistent with the S-REF model (Wells, 2011; Wells and Matthews, 1994, 1996) according to which metacognitive beliefs may be related with the use of maladaptive forms of mental control, i.e., Cognitive Attentional Syndrome (CAS), which may reduce the capacity for effective self-regulation, intensifying and prolonging negative emotions (Capobianco and Nordahl, 2021; Wells, 2009; Wells and Matthews, 1994, 1996). Consistent with the S-REF model (Wells and Matthews, 1994, 1996), low use of cognitive reappraisal, higher engagement on expressive suppression and on repetitive negative thinking (i.e., worry and rumination) may be considered as a part of the CAS (Capobianco and Nordahl, 2021; Wells, 2011; Wells and Matthews, 1994, 1996).
3. An increase of emotion dysregulation may be associated with an activation of dysfunctional metacognitive beliefs (Akbari 2017; Azzi et al., 2022; Casale et al., 2016; Poormahdy et al., 2022; Rogier et al., 2022; Salguero et al., 2019)*.*

Based on these findings, in line with the triphasic formulation of the S-REF model (Spada et al., 2013) and with the metacognitive model of psychopathology (Wells, 2000), we propose a preliminary conceptualization of the metacognitive model of emotion dysregulation (Figure 2). Consistent with the S-REF model of psychological disorders (Wells, 2011; Wells and Matthews, 1994, 1996) literature seems suggest that metacognitive beliefs activated in response to internal states (i.e., cognitions, thoughts, and emotions), may be associated either directly or via the use of maladaptive forms of mental control (i.e., low use of cognitive reappraisal, higher use of expressive suppression, higher engagement on repetitive negative thinking, that within the framework of S-REF model could be part of the CAS) with emotion dysregulation, and *vice-versa.* Emotion dysregulation has been considered as a multifaceted construct (Gratz & Roemer, 2004), which including cognitive features. One component of emotion dysregulation (Gratz & Roemer, 2004) may reflect dysregulated cognitions and thoughts and these may be associated with dysfunctional metacognitions (e.g., meta-cognition about distress tolerance, metacognitive beliefs about emotions) (Akbari, 2017; Leahy et al., 2019; Manser et al., 2012) (Figure 2). However, further research is necessary in order to gain more clarity on the issue.

The association between metacognitive beliefs and emotion dysregulation among adolescents is poorly investigated. There is evidence to suggest that among adolescents a higher endorsement of metacognitive beliefs may be associated with difficulties in emotion dysregulation (Laghi et al., 2018; Mazloom et al., 2016; Mohammadkhani et al., 2020; Spada & Marino, 2017), however, the role of specific metacognitive beliefs is still unclear (Laghi et al., 2018; Spada & Marino, 2017).

Although studies included in the present review provide evidences about the possible association between metacognitive beliefs and emotion dysregulation, some issues are still unclear: (a) due to the conflicting findings, whether a higher endorsement of dysfunctional metacognitive beliefs is mostly associated with specific sub-components of the emotion dysregulation than others (Azzi et al. 2022; Leahy et al., 2019; Dragan, 2015); (b) only one study (Deleurme et al., 2022) explored the associations between metacognitive beliefs and greater expression of positive emotion, showing no significant associations between them; however the paucity of studies in this field does not allow to draw any conclusion regarding the association between metacognitive beliefs and dysregulation of positive emotion (Weiss et al., 2015); (c) due to the conflicting findings (Akbari et al., 2021; Azzi et al., 2022; Mansueto et al., 2022), whether specific metacognitive beliefs may be more critical than other in enchaining dysfunctional emotion regulation strategies; (d) a partially unexpected result is the negative associations observed in both non-clinical and clinical samples between cognitive self-consciousness (i.e., the tendency to monitor one's own thoughts and focuses attention inwards, e.g. “I pay close attention to the way my mind works”) and emotion dysregulation (Mansueto et al., 2022), suggesting that cognitive self-consciousness may be associated with greater ease in emotion regulation (Mansueto et al., 2022). A possible explanation for this result may lie with literature suggesting that, compared with other metacognitive beliefs, cognitive self-consciousness tends to be negatively associated with some problematic tendencies as inhibitory behaviour tendency or lower impulsivity (Efrati et al., 2021); (d) although some evidence suggest that the CAS (Wells, 2011; Wells and Matthews, 1994, 1996) (at least in terms of low use of cognitive reappraisal, higher expressive suppression, higher repetitive negative thinking) may be associated with emotion dysregulation, whether CAS and emotion dysregulation are two different constructs or whether these two constructs overlap with each other is still unclear (Palmieri et al., 2023b).

**4.1 Clinical implications**

Some clinical implications arise from the findings of the current systematic review. Firstly, in terms of assessment, information about metacognitive beliefs may be gathered during the anamnesis process of emotion dysregulation. Metacognitive profiling interviewing (Wells, 2000) and self-report measures may be used to identify metacognitive beliefs (e.g., Wells and Cartwright-Hatton, 2004; Manser et al., 2012). Secondly, consistently with the metacognitive tenet (Spada et al., 2013; Wells, 2000), the metacognitive model of emotion dysregulation here proposed (Figure 2) may be used to define an idiosyncratic case conceptualization of emotion dysregulation, as well as to socialize participants to the idea that metacognitive beliefs either directly or via the use of maladaptive forms of mental control (that within the framework of S-REF model could be described as part of the CAS) may hinder the process of emotional regulation. Thirdly, in terms of interventions, modifying metacognitive beliefs (Wells, 2011; Wells and Matthews, 1994, 1996) could be considered as a potential therapeutic target for treatments aimed to reduce the propensity to engage in dysfunctional emotion regulation strategies and the levels of emotion dysregulation. Metacognitive Therapy techniques, such as the restructuring metacognitive beliefs, thorough metacognitive focused Socratic questioning as well as behavioural experiments, the interruption of repetitive negative thinking through a combination of postponement, detached mindfulness, and attention training may be suitable approaches to reduce emotion dysregulation (Papageorgiou, 2015; Wells, 2011; Wells and Matthews, 1994, 1996). From a preventive perspective it may of help to utilise Metacognitive Therapy techniques (Esbjørn et al., 2015; Wells, 2011) to reduce difficulties in emotion regulation in adolescents.

**4.2 Limitations**

This review should be interpreted in the context of the limitations of the included studies: (a) all studies are cross-sectional; this precludes the drawing of conclusions as to whether or not metacognitive beliefs play a causal role in predicting higher levels of emotion dysregulation, and *vice-versa*; (b) the instruments used in the reviewed searches to assess metacognitive beliefs and emotion dysregulation and emotion regulation strategies are not homogeneous; (c) in almost of studies the sample were mainly composed by females; (d) based on Newcastle–Ottawa quality criteria (Herzog et al., 2013; Wells et al., 2010), most of the studies were of medium quality; indeed, the role of potential cofounding factors in the association between metacognitive beliefs and emotion dysregulation (e.g., gender, stressful life events, anxiety, depression, impulsivity) were poorly considered; (e) the association between positive/negative metacognitive beliefs about cognitive and/or affective experiences and emotion dysregulation were not investigated; (f) focusing on published studies inevitably entails that information about negative results is lost; (g) the association between metacognitive beliefs and emotion dysregulation among adolescents is still poorly investigated; and (h) no validated protocol was used to assess the risk of bias. Nevertheless, these limitations suggest some directions for future research which should: (a) include longitudinal designs testing the association between metacognitive beliefs and emotion dysregulation, and *vice-versa*; (b) explore the role of potential cofounding factors (e.g., gender, stressful life events, distress, anxiety, depression, impulsivity) in the association between metacognitive beliefs and emotion dysregulation; (c) include measures of positive and negative metacognitive beliefs about cognitive and/or affective experiences; (d) include measures of positive emotion dysregulation (Weiss et al., 2015); (e) explore the association between metacognitive beliefs and emotional dysregulation sub-components; (f) explore the potential role of other components of the CAS (e.g., anger rumination) (Oliva et al., 2023; Wells, 2011; Wells and Matthews, 1994, 1996; Yalvaç & Gaynor, 2021) in the association between metacognitive beliefs and emotion dysregulation; and (g) undertake further studies to explore the association between metacognitive beliefs emotion dysregulation in children and adolescents.

**5. CONCLUSION**

A higher endorsement of metacognitive beliefs may be associated, either directly or via the or via maladaptive forms of mental control (e.g., worry, rumination, suppression), to emotion dysregulation. Metacognitive beliefs could be the potential therapeutic target in clinical interventions aimed at reducing emotion regulation difficulties.

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**Figure 1.** Flow diagram of the search

**Identification of studies via other methods**

**Identification of studies via databases and registers**

Records identified from:

manual serach (n = **2**)

Records removed *before screening*:

Duplicate records removed (n = **235**)

Records marked as ineligible by automation tools (n = **0**)

Records removed for other reasons (n = **0**)

Records identified from:

Databases (n = **568**)

PubMed (n= **242**)

EBSCO*host* (n= **171**)

Web of Science (n=**155**)

Registers (n = **0**)

**Identification**

Records excluded (n = **298**)

Out of the topic (n= **279**)

No metacognition (n= **7**)

No emotion dysregulation (n= **12**)

Records screened

(n = **333**)

Reports sought for retrieval

(n = **35**)

Reports not retrieved

(n = **0**)

**Screening**

Reports excluded (n= **16**)

No metacognition (n= **1**)

No metacognition referred to S-REF model (n= **4**)

No emotion dysregulation (n= **6**)

Out of the topic (n= **5**)

No data analyses available on the association between metacognition and emotion dysregulation (n= **1**)

Reports assessed for eligibility

(n = **35**)

Studies included in review

(n = **19**)

Reports of included studies

(n = **19**)

**Included**

**Table 1.** Study summary

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Authors** | **Study design** | **Sample size** | **Country** | **Age (years)**  **(Mean ± SD; range)** | **Sex (n,%)** | **Metacognitive beliefs measure** | **Emotion dysregulation** |
| Manser,  et al., 2012 | Cross- sectional | University students  (n=288) | United Kingdom | 28.05 ± 10.99 | Males  (n = 74, 26%)  Females  (n = 214, 74%) | BAEQ | BSL |
| Dragan,  et al., 2015 | Cross- sectional | Problem drinkers  (n=502) | Poland | 21.78± 1.84 | Females (n=502, 100%) | PAMS  NAMS | DERS |
| Casale,  et al., 2016 | Cross- sectional | Undergraduate university students  (n=293) | Italy | 21.73 ± 2.17 | Males  (n= 141, 48%)  Females  (n= 152, 52%) | Distraction scale of the Online Cognition Scale  Schouten’s scale | DERS |
| Mazloom et al. 2016 | Cross- sectional | High school students  (n=678) | Iran | 15 ± 0.81 | Males  (n = 311, 46%) Females  (n = 367, 54%) | MCQ-A | DERS |
| Akbari,  2017 | Cross- sectional | Undergraduate university students  (n=413) | Iran | 20.13 | Males  (n=211, 52%)  Females (n=202, 48%) | MCQ-30 | DERS |
| Spada & Marino, 2017 | Cross- sectional | Adolescent  (n = 380) | Italy | 15.82 ± 1.67 | Females  (n = 118, 31%)  Males  (n = 262, , 69%) | MCQ-30 | SEHS |
| Laghi  et al., 2018 | Cross- sectional | Adolescent  (n = 804) | Italy | 17.45 ± 1.02 | Females  (n = 400, 49%)  Males  (n = 404, 51%) | MCQ-30 | DERS |
| Leahy  et al., 2019 | Cross- sectional | Adult patients under psychotherapy  (n=425) | USA | 34.9 ± 11.9 | Males  (n=166, 39%)  Females (n=259, 61%) | MCQ-30 | LESS |
| Ottonello, et al., 2019 | Cross- sectional | Alcohol dependence inpatients  (n=65) | Italy | 51.03 ± 8.71 | Males  (n= 46, 71%)  Females  (n= 19, 29%) | PAMS  NAMS | DERS |
| Salguero et al., 2019 | Cross- sectional | Undergraduate students and non-students (n=768) | Spain | 31.82 ± 13.03 | Males  (n=238, 31%)  Females (n=530, 69%) | MCQ-30 | DERS |
| Mohammadkhani  et al., 2020 | Cross-sectional | Adolescents  (n=253) | Iran | 12-17 years old | Not reported | MCQ-C | CERQ |
| Akbari  et al., 2021 | Cross- sectional | General population (n=541) | Iran | 41.3 ± 13.2 | Males  (n=258, 48%)  Females (n=283, 52%) | MCQ-30 | ERQ |
| Azzi et al., 2022 | Cross- sectional | Alcohol drinkers (n=335) | Lebanon | 32.16 ± 11.09 | Males  (n=176, 52%)  Females (n=159, 48%) | PAMS  NAMS | ERQ |
| Deleurme et al., 2022 | Cross- sectional | Undergraduate students (n=626) | Canada | 22.21 ± 6.06 | Males  (n=177, 28%)  Females  (n=449, 71%) | MCQ-30 | BEQ |
| Mansueto et al., 2022 | Study 1  Cross- sectional | General population (n=395) | Italy | 36.4 ± 13.9 | Males  (n=150, 38%)  Females (n=245, 62%) | MCQ-30 | DERS |
| Study 2  Cross- sectional | Outpatients seeking psychological treatment (n=189)\* | Italy | 36.1 ± 11.7 | Males  (n=118, 62%)  Females (n=71, 38%) | MCQ-30 | DERS |
| Poormahdy et al., 2022 | Cross- sectional | Participants with nicotine dependence  (n=450) | Iran | 32.28 ± 11.35 | Males  (n=450, 100%) | MSQ | DERS |
| Rogier et al., 2022 | Cross- sectional | General population  (n=719) | Italy | 34.36 ± 14.38 | Males  (n=234, 33%)  Females (n=485, 67%) | EBQ | DERS-SF |
| Akbari et al., 2023 | Cross-sectional | General population  (n=613) | Iran | 24.61±8 | Males  (n = 194, 32%)  Females  (n= 419, 68%) | MSUQ | ERQ |
| Palmieri et al., 2023 | Cross-sectional | Outpatients with eating disorder\*\*  (n=104) | Italy | 28.79± 9.14 | Females (n=104, 100%) | MCQ | DERS |

Note: BAEQ = Beliefs about Emotions Questionnaire; BEQ= Berkeley Expressivity Questionnaire; BSL = borderline symptom list; CERQ: Cognitive Emotion Regulation Questionnaire; DERS= Difficulties in emotion regulation scale; DERS-SF= Difficulties in Emotion Regulation Scale Short Form; EBQ= Emotion beliefs questionnaire; ERQ= Emotion Regulation Questionnaire; LESS= Leahy Emotional Schema Scale-II; MCQ-A: Metacognitions Questionnaire—Adolescent Version; MCQ-C: Metacognitions Questionnaire for children; MCQ-30= Metacognitions Questionnaire; MSQ= Metacognitions about Smoking Questionnaire; MSUQ= Metacognitions about Smartphone Use Questionnaire; NAMS= Negative alcohol metacognitions scale; PAMS= Positive alcohol metacognitions scale; SEHS = Social and Emotion Health Survey. \*The sample included outpatients with: personality disorders (n=70); anxiety disorders (n=117); affective disorders (n=77); obsessive-compulsive disorder (n=14); alcohol dependence and abuse (n=13); substance use (n=4); bulimia nervosa (n=4); binge eating (n=4); high-risk suicidal ideation (n=3); post-traumatic stress disorder (n=4); grief disorder (n=2); sleep disorder (n=1). \*\*The sample included outpatients with: Anorexia Nervosa (n=31); Bulimia Nervosa (n=32); Binge Eating Disorder (n=34); Eating Disorder not otherwise specified (n=7=).

**Table 2.** Studies investigating the association between generic metacognitive beliefs about cognitive and/ore affective experiences and emotion dysregulation

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **BELIEFS ABOUT THE NEED TO CONTROL THOUGHTS** | | | | | | | | | | | | |
| **Authors** | | **Study design** | | **Sample size** | | **Country** | | **Age (years) Mean ± SD** | **Sex (n,%)** | **Metacognitive beliefs measure** | **Emotion dysregulation** | **Main findings** |
| Akbari,  2017 | | Cross- sectional | | Undergraduate university students  (n=413) | | Iran | | 20.13 | Males (n=211, 52%)  Females (n=202, 48%) | MCQ-30 | DERS | Statistically significant positive correlation between metacognitive beliefs (MCQ-30 total score) and emotion dysregulation (DERS total score) (r=0.43, p<0.001). |
| Salguero et al., 2019 | | Cross- sectional | | Undergraduate students and non-students (n=768) | | Spain | | 31.82 ± 13.03 | Males (n=238, 31%)  Females (n=530, 69%) | MCQ-30 | DERS | Statistically significant positive correlation between metacognitive beliefs (MCQ-30 total score) and emotion dysregulation (DERS total score) (r=0.54, p=<0.01). |
| Leahy  et al., 2019 | | Cross- sectional | | Adult patients under psychotherapy (n=425) | | USA | | 34.9 ± 11.9 | Males (n=166, 39%)  Females (n=259, 61%) | MCQ | LESS | Statistically significant negative correlation between metacognitive beliefs about need to control thoughts and acceptance of feelings (r=-0.46, p<0.01). |
| Akbari  et al., 2021 | | Cross- sectional | | General population (n=541) | | Iran | | 41.3 ± 13.2 | Males (n=258, 48%)  Females (n=283, 52%) | MCQ-30 | ERQ | Statistically significant negative correlation between beliefs about the need to control thoughts and cognitive reappraisal (r=-0.23, p<0.01).  Statistically significant positive correlation between beliefs about the need to control thoughts and expressive suppression (r=0.29, p<0.01). |
| Mansueto et al., 2022 | | Study 1  Cross- sectional | | General population (n=395) | | Italy | | 36.4 ± 13.9 | Males (n=150, 38%)  Females (n=245, 62%) | MCQ-30 | DERS | Statistically significant positive correlation between beliefs about the need to control thoughts and emotion dysregulation (DERS total score) (r=0.44, p<0.001). |
| Mansueto et al., 2022 | | Study 2  Cross- sectional | | Outpatients seeking psychological treatment  (n=189) | | Italy | | 36.1 ± 11.7 | Males (n=118, 62%)  Females (n=71, 38%) | MCQ-30 | DERS | Statistically significant positive correlation between beliefs about the need to control thoughts and emotion dysregulation (DERS total score) (r=0.59, p<0.001). |
| Palmieri et al., 2023 | | Cross-sectional | | Outpatients with eating disorder  (n=104) | | Italy | | 28.79± 9.14 | Females (n=104, 100%) | MCQ | DERS | Statistically significant positive correlation between beliefs about the need to control thoughts (r=0.61, p<0.001), and emotion dysregulation (DERS total score). |
| **COGNITIVE COMPETENCE** | | | | | | | | | | | | |
| **Authors** | | **Study design** | | **Sample size** | | **Country** | | **Age (years) Mean ± SD** | **Sex (n)** | **Metacognitions measure** | **Emotion dysregulation measure** | **Main findings** |
| Leahy  et al., 2019 | | Cross- sectional | | Adult patients under psychotherapy  (n=425) | | USA | | 34.9 ± 11.9 | Males (n=166, 39%)  Females (n=259, 61%) | MCQ | LESS | No statistically significant correlation between cognitive competence and acceptance of feelings (r=-0.12, p>.05). |
| **COGNITIVE SELF-CONSCIOUSNESS** | | | | | | | | | | | | |
| **Authors** | **Study design** | | **Sample size** | | **Country** | | | **Age (years) Mean ± SD** | **Sex (n,%)** | **Metacognitive beliefs measure** | **Emotion dysregulation / Emotion regulation strategies**  **measure** | **Main findings** |
| Leahy  et al., 2019 | Cross- sectional | | Adult patients under psychotherapy  (n=425) | | USA | | | 34.9 ± 11.9 | Males (n=166, 39%)  Females (n=259, 61%) | MCQ | LESS | Statistically significant negative correlation between cognitive self-consciousness and acceptance of feelings. |
| Akbari  et al., 2021 | Cross- sectional | | General population (n=541) | | Iran | | | 41.3 ± 13.2 | Males (n=258, 48%)  Females (n=283, 52%) | MCQ-30 | ERQ | Statistically significant positive correlation between cognitive self-consciousness and expressive suppression (r=0.23, p<0.01).  Statistically significant negative correlation between cognitive self-consciousness and cognitive reappraisal (r=-0.16, p<0.01). |
| Mansueto et al., 2022 | Study 1  Cross- sectional | | General population (n=395) | | Italy | | | 36.4 ± 13.9 | Males (n=150, 38%)  Females (n=245, 62%) | MCQ-30 | DERS | Statistically significant positive correlation between cognitive self-consciousness and emotion dysregulation (DERS total score) (r=0.16, p<0.01). |
| Mansueto et al., 2022 | Study 2  Cross- sectional | | Outpatients seeking psychological treatment  (n=189) | | Italy | | | 36.1 ± 11.7 | Males (n=118, 62%)  Females (n=71, 38%) | MCQ-30 | DERS | No statistically significant correlation between cognitive self-consciousness and emotion dysregulation (DERS total score). |
| Palmieri et al., 2023 | Cross-sectional | | Outpatients with eating disorder  (n=104) | | Italy | | | 28.79± 9.14 | Females (n=104, 100%) | MCQ | DERS | No statistically significant correlations between cognitive self-consciousness and emotion dysregulation (DERS total score). |
| **COGNITIVE CONFIDENCE** | | | | | | | | | | | | |
| **Authors** | | **Study design** | | **Sample size** | **Country** | | **Age (years) Mean ± SD** | | **Sex (n,%)** | **Metacognitive beliefs measure** | **Emotion dysregulation** | **Main findings** |
| Akbari  et al., 2021 | | Cross- sectional | | General population (n=541) | Iran | | 41.3 ± 13.2 | | Males (n=258, 48%)  Females (n=283, 52%) | MCQ-30 | ERQ | No statistically significant correlation between cognitive confidence and cognitive reappraisal.  Statistically significant positive correlation between cognitive confidence and expressive suppression (r=0.15, p<0.05). |
| Mansueto et al., 2022 | | Study 1  Cross- sectional | | General population (n=395) | Italy | | 36.4 ± 13.9 | | Males  (n=150, 38%)  Females (n=245, 62%) | MCQ-30 | DERS | Statistically significant positive correlation between cognitive confidence and emotion dysregulation (DERS total score) (r=0.35, p<0.001). |
| Mansueto et al., 2022 | | Study 2  Cross- sectional | | Outpatients seeking psychological treatment  (n=189) | Italy | | 36.1 ± 11.7 | | Males  (n=118, 62%)  Females  (n=71, 38%) | MCQ-30 | DERS | Statistically significant positive correlation between cognitive confidence and emotion dysregulation (DERS total score) (r=0.31, p<0.001). |
| Palmieri et al., 2023 | | Cross-sectional | | Outpatients with eating disorder  (n=104) | Italy | | 28.79± 9.14 | | Females (n=104, 100%) | MCQ | DERS | No statistically significant correlation between cognitive confidence and emotion dysregulation (DERS total score). |
| **METACOGNITIVE BELIEFS ABOUT EMOTIONS** | | | | | | | | | | | | |
| **Authors** | | **Study design** | | **Sample size** | | **Country** | | **Age (years) Mean ± SD** | **Sex (n,%)** | **Metacognitive beliefs measure** | **Emotion dysregulation** | **Main findings** |
| Manser,  et al., 2012 | | Cross- sectional | | University students  (n=288) | | United Kingdom | | 28.05± 10.99 | Males  (n= 74, 26%)  Females  (n= 214, 74%) | BAEQ | BSL | Statistically significant positive correlation between metacognitive beliefs about emotions and emotion dysregulation (r= 0.50, p <0.001). |
| Rogier et al., 2022 | | Cross- sectional | | General population  (n=719) | | Italy | | 34.36 ± 14.38 | Males (n=234, 33%)  Females (n=485, 67%) | EBQ | DERS-SF | Statistically significant positive correlation between metacognitive beliefs about the emotion uncontrollability and emotional dysregulation (DERS-SF total score) (r=0.36, p<0.001).  Statistically significant positive correlation between metacognitive beliefs regarding the lack of utility of positive emotions and emotional dysregulation (DERS-SF total score) (r=0.31, p<0.001).  Statistically significant positive correlation between metacognitive beliefs regarding the lack of utility of negative emotions and emotional dysregulation (DERS-SF total score) (r=0.24, p<0.001). |

Note: BAEQ = Beliefs about Emotions Questionnaire; BSL = borderline symptom list; DERS= Difficulties in emotion regulation scale; DERS-SF= Difficulties in Emotion Regulation Scale Short Form; EBQ= Emotion beliefs questionnaire; ERQ= Emotion Regulation Questionnaire; LESS= Leahy Emotional Schema Scale-II; MCQ\MCQ-30= Metacognitions Questionnaire.

**Table 3.** Studies investigating the association between positive metacognitive beliefs about the benefits of engaging in specific strategies to control cognitive-affective state and emotion dysregulation

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **POSITIVE BELIEFS ABOUT WORRY** | | | | | | | | |
| **Authors** | **Study design** | **Sample size** | **Country** | **Age (years) Mean ± SD** | **Sex (n,%)** | **Metacognitive beliefs measure** | **Emotion dysregulation** | **Main findings** |
| Leahy  et al., 2019 | Cross- sectional | Adult patients under psychotherapy  (n=425) | USA | 34.9 ± 11.9 | Males (n=166, 39%)  Females (n=259, 61%) | MCQ | LESS | Statistically significant negative correlation between positive beliefs about worry and acceptance of feelings (r=-0.21, p<0.01). |
| Akbari  et al., 2021 | Cross- sectional | General population (n=541) | Iran | 41.3 ± 13.2 | Males (n=258, 52%)  Females (n=283, 48%) | MCQ-30 | ERQ | Statistically significant negative correlation between positive beliefs about worry and cognitive reappraisal  (r=-0.18, p<0.01).  No statistically significant correlation between positive beliefs about worry and expressive suppression  (r=0.06, p<0.05). |
| Deleurme et al., 2022 | Cross- sectional | Undergraduate students  (n=626) | Canada | 22.21 ± 6.06 | Males (n=177, 28%)  Females  (n=449, 71%) | MCQ-30 | BEQ | Statistically significant positive correlations between positive beliefs about worry and greater expression of negative emotions (r=0.09, p<0.025), greater emotional reactions to experiences (r=0.10, p<0.01).  No statistically significant correlation between positive beliefs about worry and greater expression of positive emotions (r=0.03, p>0.05). |
| Mansueto et al., 2022 | Study 1  Cross- sectional | General population (n=395) | Italy | 36.4 ± 13.9 | Males (n=150, 38%)  Females (n=245, 62%) | MCQ-30 | DERS | Statistically significant positive correlation between positive beliefs about worry and emotion dysregulation (DERS total score) (r=0.20, p<0.001). |
| Mansueto et al., 2022 | Study 2  Cross- sectional | Outpatients seeking psychological treatment  (n=189) | Italy | 36.1 ± 11.7 | Males (n=118, 62%)  Females (n=71, 38%) | MCQ-30 | DERS | Statistically significant correlation between positive beliefs about worry and emotion dysregulation (DERS total score) (r=0.15, p<0.05). |
| Palmieri et al., 2023 | Cross-sectional | Outpatients with eating disorder  (n=104) | Italy | 28.79± 9.14 | Females (n=104, 100%) | MCQ | DERS | No statistically significant correlation between positive beliefs about worry and emotion dysregulation (DERS total score). |
| **POSITIVE METACOGNITIVE BELIEFS ABOUT INTERNET USE or SMARTPHONE USE** | | | | | | | | |
| **Authors** | **Study design** | **Sample size** | **Country** | **Age (years) Mean ± SD** | **Sex (n,%)** | **Metacognitive beliefs measure** | **Emotion dysregulation** | **Main findings** |
| Casale,  et al., 2016 | Cross- sectional | Undergraduate university students  (n=293) | Italy | 21.73 ± 2.17 | Males  (n= 141, 48%)  Females  (n= 152, 52%) | Distraction scale of the Online Cognition Scale  Schouten’s scale | DERS | Statistically significant positive correlation between positive metacognitions (Escapism) and emotion dysregulation (DERS total score) (r=0.31, p<0.001).  Statistically significant positive correlation between positive metacognitions (Controllability) and emotion dysregulation (DERS total score) (r=0.24, p<0.001). |
| Akbari et al., 2023 | Cross-sectional | General population  (n=613) | Iran | 24.61±8 | Males  (n = 194, 48%)  Females  (n= 419, 52%) | MSUQ | ERQ | Statistically significant positive correlations between positive metacognitive beliefs about emotional and cognitive regulation and expressive suppression (r=0.12, p<0.01) and cognitive reappraisal (r=0.09, p<0.05). |
| **POSITIVE METACOGNITIVE BELIEFS ABOUT ALCOHOL USE** | | | | | | | | |
| **Authors** | **Study design** | **Sample size** | **Country** | **Age (years) Mean ± SD** | **Sex (n,%)** | **Metacognitive beliefs measure** | **Emotion dysregulation** | **Main findings** |
| Dragan,  et al., 2015 | Cross- sectional | Problem drinkers  (n=502) | Poland | 21.78± 1.84 | Females (n=502, 100%) | PAMS | DERS | Statistically significant positive correlations between positive metacognitive beliefs about alcohol use and non acceptance of emotional responses (r=0.33, p<0.001), difficulties engaging in goal-directed behaviour (r=0.30, p<0.001), impulse control difficulties (r=0.35, p<0.001), limited access to emotion regulation strategies (r= 0.27, p< 0.001), lack of emotional clarity (r=0.27, p<0.001), DERS total score (r=0.39, p<0.001).  Non-statistically significant correlation between positive metacognitions about alcohol use and lack of emotional awareness. |
| Ottonello, et al., 2019 | Cross- sectional | Alcohol dependence inpatients  (n=65) | Italy | 51.03 ± 8.71 | Males  (n= 46, 71%)  Females  (n= 19, 29%) | PAMS | DERS | Statistically significant positive correlation between positive alcohol metacognitive beliefs and emotion dysregulation (DERS total score) (r=0.36, p<0.05). |
| Azzi et al., 2022 | Cross- sectional | Alcohol drinkers (n=335) | Lebanon | 32.16 ± 11.09 | Males (n=176, 52%)  Females (n=159, 48%) | PAMS | ERQ | Statistically significant positive correlations between positive metacognitive beliefs about emotional self-regulation and cognitive reappraisal (r=0.21, p<0.001), expressive suppression (r=0.13, p<0.05).  Statistically significant positive correlations between positive metacognitive beliefs about cognitive self-regulation and cognitive reappraisal (r=0.19, p<0.01), expressive suppression (r=0.29, p<0.001). |
| **POSITIVE METACOGNITIVE BELIEFS ABOUT SMOKING** | | | | | | | | |
| **Authors** | **Study design** | **Sample size** | **Country** | **Age (years) Mean ± SD** | **Sex (n,%)** | **Metacognitive beliefs measure** | **Emotion dysregulation** | **Main findings** |
| Poormahdy et al., 2022 | Cross- sectional | Participants with nicotine dependence  (n=450) | Iran | 32.28 ± 11.35 | Males (n=450, 100%) | MSQ | DERS | Statistically significant positive correlation between positive metacognitive beliefs about smoking and emotion dysregulation (DERS total score) (r=0.41, p<0.01). |

Note: BEQ= Berkeley Expressivity Questionnaire; DERS= Difficulties in emotion regulation scale; ERQ= Emotion Regulation Questionnaire; LESS= Leahy Emotional Schema Scale-II; MCQ\MCQ-30= Metacognitions Questionnaire; MSQ= Metacognitions about Smoking Questionnaire; MSUQ= Metacognitions about Smartphone Use Questionnaire; PAMS= Positive alcohol metacognitions scale.

**Table 4.** Studies investigating the association between negative metacognitive beliefs about the uncontrollability and danger of strategies to control cognitive-affective states and the detrimental derivates of employing such strategies and emotion dysregulation

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NEGATIVE BELIEFS ABOUT THOUGHTS CONCERNING UNCONTROLLABILITY AND DANGER** | | | | | | | | |
| **Authors** | **Study design** | **Sample size** | **Country** | **Age (years) Mean ± SD** | **Sex (n,%)** | **Metacognitive beliefs measure** | **Emotion dysregulation** | **Main findings** |
| Leahy  et al., 2019 | Cross- sectional | Adult patients under psychotherapy  (n=425) | USA | 34.9 ± 11.9 | Males (n=166, 39%)  Females (n=259, 61%) | MCQ | LESS | Statistically significant negative correlation between negative beliefs about thoughts concerning uncontrollability and danger and acceptance of feelings (r=-0.21, p<0.01). |
| Akbari  et al., 2021 | Cross- sectional | General population (n=541) | Iran | 41.3 ± 13.2 | Males (n=258, 48%)  Females (n=283, 52%) | MCQ-30 | ERQ | Statistically significant negative correlation between negative beliefs about thoughts concerning uncontrollability and danger and cognitive reappraisal (r=-0.29, p<0.01).  Statistically significant positive correlation between negative beliefs about thoughts concerning uncontrollability and danger and expressive suppression (r=0.31, p<0.01). |
| Deleurme et al., 2022 | Cross- sectional | Undergraduate students (n=626) | Canada | 22.21 ± 6.06 | Males (n=177, 28%)  Females  (n=449, 71%) | MCQ-30 | BEQ | Statistically significant positive correlation between negative beliefs about thoughts concerning uncontrollability and danger and greater expression of negative emotions (r=0.12, p<0.01), greater emotional reactions to experiences (r=0.38, p<0.01).  No statistically significant correlation between negative beliefs about thoughts concerning uncontrollability and danger and greater expression of greater positive emotions. |
| Mansueto et al., 2022 | Study 1  Cross- sectional | General population (n=395) | Italy | 36.4 ± 13.9 | Males (n=150, 38%)  Females (n=245, 62%) | MCQ-30 | DERS | Statistically significant positive correlation between negative beliefs about thoughts concerning uncontrollability and danger and emotion dysregulation (DERS total score) (r=0.50, p<0.001). |
| Mansueto et al., 2022 | Study 2  Cross- sectional | Outpatients seeking psychological treatment  (n=189) | Italy | 36.1 ± 11.7 | Males (n=118, 62%)  Females (n=71, 38%) | MCQ-30 | DERS | Statistically significant positive correlation between negative beliefs about thoughts concerning uncontrollability and danger and emotion dysregulation (DERS total score) (r=0.60, p<0.001). |
| Palmieri et al., 2023 | Cross-sectional | Outpatients with eating disorder  (n=104) | Italy | 28.79± 9.14 | Females (n=104, 100%) | MCQ | DERS | Statistically significant positive correlations between negative beliefs about thoughts concerning uncontrollability and danger and emotion dysregulation (DERS total score) (r=0.57, p<0.001). |
| **NEGATIVE METACOGNITIVE BELIEFS ABOUT ALCOHOL USE** | | | | | | | | |
| Dragan,  et al., 2015 | Cross- sectional | Problem drinkers  (n=502) | Poland | 21.78± 1.84 | Females (n=502, 100%) | NAMS | DERS | Statistically significant positive correlations between and negative metacognitive beliefs about alcohol use and non-acceptance of emotional responses (r=0.17, p<0.001), difficulties engaging in goal-directed behaviour (r=0.14, p<0.01), lack of emotional clarity (r= 0.08, p<0.05), DERS total score (r=0.24, p<0.001).  Non-statistically significant correlations between negative metacognitions about alcohol use and impulsivity lack of emotional awareness, limited access to emotion regulation strategies. |
| Ottonello, et al., 2019 | Cross- sectional | Alcohol dependence inpatients  (n=65) | Italy | 51.03 ± 8.71 | Males  (n= 46, 71%)  Females  (n= 19, 29%) | NAMS | DERS | Statistically significant positive correlation between negative alcohol metacognitions and emotion dysregulation (DERS total score) (r=0.41, p<0.05). |
| Azzi et al., 2022 | Cross- sectional | Alcohol drinkers (n=335) | Lebanon | 32.16 ± 11.09 | Males (n=176, 52%)  Females (n=159, 48%) | NAMS | ERQ | Statistically significant positive correlation between negative metacognitive beliefs about the uncontrollability of drinking and expressive suppression (r=0.20, p<0.001).  Statistically significant positive correlation between negative metacognitive beliefs about cognitive harm due to drinking and expressive suppression (r=0.12, p<0.05).  No statistically significant correlation between negative metacognitive beliefs about the uncontrollability of drinking and cognitive reappraisal.  No statistically significant correlation between negative metacognitive beliefs about cognitive harm due to drinking and cognitive reappraisal. |
| **NEGATIVE METACOGNITIVE BELIEFS ABOUT SMOKING** | | | | | | | | |
| Poormahdy et al., 2022 | Cross- sectional | Participants with nicotine dependence  (n=450) | Iran | 32.28 ± 11.35 | Males (n=450, 100%) | MSQ | DERS | Statistically significant positive correlation between negative metacognitive beliefs about smoking and emotion dysregulation (DERS total score) (r=0.26, p<0.01). |
| **NEGATIVE METACOGNITIVE BELIEFS ABOUT SMARTPHONE USE** | | | | | | | | |
| Akbari et al., 2023 | Cross-sectional | General population  (n=613) | Iran | 24.61±8 | Males  (n = 194, 32%)  Females  (n= 419, 68%) | MSUQ | ERQ | Statistically significant negative correlation between negative metacognitive beliefs about smartphone use and cognitive reappraisal (r=-0.10, p<0.01).  No statistically significant correlations between negative metacognitive beliefs about smartphone use and expressive suppression. |

Note: BEQ= Berkeley Expressivity Questionnaire; DERS= Difficulties in emotion regulation scale; ERQ= Emotion Regulation Questionnaire; LESS= Leahy Emotional Schema Scale-II; MCQ\MCQ-30= Metacognitions Questionnaire; MSQ= Metacognitions about Smoking Questionnaire; MSUQ= Metacognitions about Smartphone Use Questionnaire; NAMS= Negative alcohol metacognitions scale.

**Table 5.** Quality Assessment for cross sectional studies using the Newcastle-Ottawa Scale

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Selection** | | | | | **Comparability** | | **Outcome** | | | | **Total score** |
| **Study** | **Representativeness of the sample** | **Sample size** | **Non-respondents**  **(satisfactory response rate is)** | **Ascertainment of the exposure** | | **The study controls for the most important factor** | **The study control for any additional factor** | **Assessment of the outcome** | | | **Statistical test** |
| **Validated measurement tool** | **Non-validated tool but it is described** | **Independent blind assessment** | **Record linkage** | **Self report** |
| Manser,  et al., 2012 |  | + |  | + |  |  |  |  |  | + | + | 4 |
| Dragan,  et al., 2015 | + | + |  | + |  |  |  |  |  | + | + | 5 |
| Casale,  et al., 2016 |  | + |  | + | + |  |  |  |  | + | + | 5 |
| Mazloom  et al. 2016 | + | + |  | + |  |  |  |  |  | + | + | 5 |
| Akbari, 2017 |  | + |  | + |  |  |  |  |  | + | + | 4 |
| Spada & Marino, 2017 |  | + |  | + |  |  |  |  |  | + | + | 4 |
| Laghi  et al., 2018 | + | + |  | + |  |  |  |  |  | + | + | 5 |
| Leahy  et al., 2019 | + | + |  | + |  |  |  |  |  | + | + | 5 |
| Salguero  et al., 2019 | + | + |  | + |  |  |  |  |  | + | + | 5 |
| Ottonello et al., 2019 |  |  |  | + |  |  |  |  |  | + | + | 3 |
| Mohammadkhani  et al., 2020 |  | + |  | + |  |  |  |  |  | + | + | 4 |
| Akbari  et al., 2021 | + | + |  | + |  |  |  |  |  | + | + | 4 |
| Azzi et al., 2022 | + | + |  | + |  |  |  |  |  | + | + | 5 |
| Deleurme et al., 2022 | + | + |  | + |  |  |  |  |  | + | + | 5 |
| Mansueto et al., 2022 | + | + |  | + |  | + | + |  |  | + | + | 7 |
| Poormahdy et al., 2022 | + | + |  | + |  |  |  |  |  | + | + | 5 |
| Rogier et al., 2022 | + | + |  | + |  |  |  |  |  | + | + | 5 |
| Akbari et al.,  2023 | + | + |  | + |  |  |  |  |  | + | + | 5 |
| Palmieri et al., 2023 | + | + |  | + |  | + | + |  |  | + | + | 7 |

**Appendix 1. Search Strategy**

(Metacognitions) AND (difficulties emotion regulation)

(Metacognitive beliefs) AND (difficulties emotion regulation)

(Positive metacognitive beliefs) AND (difficulties emotion regulation)

(Negative metacognitive beliefs) AND (difficulties emotion regulation)

(Positive beliefs about worry) AND (difficulties emotion regulation)

(Negative Beliefs about Thoughts concerning Uncontrollability and Danger) AND (difficulties emotion regulation)

(Cognitive Self-Consciousness) AND (difficulties emotion regulation)

(Beliefs about the Need to Control Thoughts) AND (difficulties emotion regulation)

**(**Cognitive Confidence) AND (difficulties emotion regulation)

**(**Metacognitions) AND (emotion dysregulation)

(Metacognitive beliefs) AND (emotion dysregulation)

(Positive metacognitive beliefs) AND (emotion dysregulation)

(Negative metacognitive beliefs) AND (emotion dysregulation)

(Positive beliefs about worry) AND (emotion dysregulation)

(Negative Beliefs about Thoughts concerning Uncontrollability and Danger) AND (emotion dysregulation)

(Cognitive Self-Consciousness) AND (emotion dysregulation)

(Beliefs about the Need to Control Thoughts) AND (emotion dysregulation)

(Cognitive Confidence) AND (emotion dysregulation)

**Appendix 2**. Self-report scales of emotion (dys)regulation

*Difficulties in Emotion Regulation Scale (DERS) (Gratz and Roemer, 2004) and Difficulties in Emotion Regulation Scale Short-Form (Kaufman et al., 2015)*

These measures yield a total score as well as scores on six subscales: (1) non-acceptance of emotional responses (Non- acceptance), (2) difficulties engaging in goal directed behavior (Goals), (3) impulse control difficulties (Impulse), (4) lack of emotional awareness (Awareness), (5) limited access to emotion regulation strategies (Strategies), and (6) lack of emotional clarity (Clarity)

*Emotion Regulation Questionnaire (ERQ) (Gross and John, 2003)*

The ERQ consists of 10 items rated on a 7-point scale. Six items measure the degree of cognitive reappraisal (e.g., “I control my emotions by changing the way I think about the situation I’m in”) and 4 items measure the degree of expressive suppression (e.g., “When I am feeling negative emotions, I make sure not to express them”).

*Berkeley Expressivity Questionnaire (BEQ) (Gross and John, 1997)*

The BEQ is a 16-item self-report questionnaire. The BEQ subscales include: positive expressivity (e.g., When I’m happy, my feelings show); negative expressivity (e.g., It is difficult for me to hide my fear); and impulse strength (e.g., My body reacts very strongly to emotional situations). Higher scores indicate greater expression of positive feelings (e.g., joy, happiness), negative feelings (e.g., fear, nervousness), and strong emotional reactions to experiences, which the individual finds difficult to control, respectively.

*Borderline Symptom List (BSL) (Bohus et al., 2007)*

The BSL is a 95-items self-rating scale evaluating borderline-typical symptomatology. The BSL yields a total score as well as scores on six subscales: self‐perception, affect regulation, self‐destruction, dysphoria, loneliness, intrusions and hostility (Bohus et al., 2007).

*Emotional Schema Scale-II (Leahy, 2002)*

The Leahy Emotional Schema Scale (LESS; Leahy, 2002) is a 28- item measure composed by assesses 14 subscales. For the purpose of the present study it was considered the acceptance of feelings subscale.

*Social and Emotion Health Survey (SEHS) (Furlong et al. 2013)*

In the study run by Marino & Spada (2017) emotion regulation was assessed with the three-items subscale measuring “emotion regulation” of the SEHS for secondary school students (Furlong et al. 2013). Participants were asked to rate on a four-point scale (1=“not at all like me” to 5=“very much like me”) how true they feel that the statements relate to them personally (i.e. “I accept responsibility for my actions”, “When I make a mistake I admit it”, “I can deal with being told no”). Answers to each item were averaged to form a single score and higher scores indicate higher levels of emotion regulation (Marino & Spada, 2017)

*Cognitive Emption Regulation Questionnaire (CERQ) (Garnefski et al., 2001)*

The CERQ consists of 36 items evaluating adaptive (i.e., Putting into Perspective, Positive Reappraisal, Refocus on Planning, Positive Refocusing) and maladaptive emotion regulation strategies (Rumination, Catastrophizing, Self-blame, Blaming others, Acceptance).

**Figure 2.** Metacognitive model of the emotion dysregulation

Trigger

(cognitions, thoughts, emotions)

**Pre-Alcohol Use Phase**

Cognitive Attentional Syndrome

(higher engagement on worry, rumination, expressive suppression, lower use of cognitive reappraisal)

CAS

Emotion dysregulation

*Generic metacognitive beliefs about cognitive and/or affective experiences*

*Negative metacognitive beliefs about the uncontrollability and danger of strategies to control cognitive-affective states and the detrimental derivates of employing such strategies cognitive-affective state*

*Positive metacognitive beliefs about the benefits of engaging in specific strategies to control cognitive-affective state*