

## Empirical Article

**Metacognitive strategies mediate the association between metacognitive beliefs and perceived quality of life**AUDUN HAVNEN,<sup>1,2</sup>  FREDERICK ANYAN<sup>1</sup> and HENRIK NORDAHL<sup>1,2</sup> <sup>1</sup>Department of Psychology, Norwegian University of Science and Technology, Trondheim, Norway<sup>2</sup>Nidaros Community Mental Health Centre, Division of Psychiatry, St. Olavs University Hospital, Trondheim, Norway

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Quality of life may be understood as a multidimensional evaluation of life circumstances in relation to values, expectations, and perceived well-being. Quality of life is thus dependent on the subjective perception of the current life situation, not only objective circumstances. According to metacognitive theory, metacognition guides the appraisal of inner experiences (i.e., thoughts and feelings) and influences how one relates to external stressors. Hence, dysfunctional metacognitive beliefs and the cognitive attentional syndrome (CAS), which includes perseverative thinking, threat monitoring and ineffective coping strategies, may negatively influence subjective quality of life. Therefore, we aimed to investigate if metacognitive beliefs and CAS strategies were associated with quality of life. A sample of 503 participants (77.1% women, mean age 41.0,  $SD = 11.5$ ) completed the metacognitions questionnaire 30 (MCQ-30), the CAS-1 and the quality of life scale (QOLS). We used structural equation modelling (SEM) to estimate associations between the variables founded in metacognitive theory. The results of the SEM showed a significant direct relationship between metacognitive beliefs and quality of life. CAS strategies mediated the effect of metacognitive beliefs on quality of life. Higher level of metacognitive beliefs was associated with greater use of CAS strategies, which in turn was associated with lower quality of life. Further, more CAS strategies were associated with lower quality of life. The results support the generic metacognitive model and suggest that stronger endorsement of dysfunctional metacognitive beliefs and corresponding CAS strategies are associated with lower quality of life. This observation held even when controlling for relevant covariates and suggests that modifying metacognitive beliefs may impact on subjective quality of life.

**Key words:** cognitive attentional syndrome, metacognitive, quality of life, S-REF model.

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## INTRODUCTION

Quality of life is a multidimensional construct that refers to experiences related to subjective well-being (Revicki, Osoba, Fairclough *et al.*, 2000). In clinical psychology research quality of life has received increased interest as an outcome measure as it is not limited to the reduction or absence of mental health symptoms, but in a broader sense relates to subjective satisfaction with different life domains (Gladiš, Gosch, Dishuk & Crits-Christoph, 1999). Although there is no consensus regarding a definition of quality of life (Burckhardt & Anderson, 2003), perceived quality of life depends on the subjective experience of functioning in relation to values and expectations (Revicki *et al.*, 2000).

In their conceptual model of quality of life, Felce and Perry (1995) argued for the importance of an individual's life conditions at an objective level and the subjective interpretation made by the individual perceiving or reacting to these conditions when explaining quality of life. Accordingly, persons who appear to share similar life circumstances, may vary with respect to perceived quality of life due to differences in the subjective experience and interpretation of the conditions in which they are living.

Extending previous conceptual models Cummins (2005) proposed a theory of quality of life that suggests well-being to depend on both objective conditions and how they are experienced. Importantly, the model suggests causal variables to influence the

relation between objective life conditions and subjective well-being, such as a perceived deficit of the objective conditions or low levels of choice in important situations. The theory thus aims to explain how well-being is a subjective experience not necessarily connected to objective life domains in a linear relationship but depends on intermediate processing.

The self-regulatory executive functioning (S-REF) model, often called the metacognitive model of psychological disorders (Wells, 2019; Wells & Matthews, 1994, 1996), might contribute to advance the understanding of the subjective experience of inner events such as thoughts and feelings in relation to external stressors. The metacognitive model describes cognitive components and processes important for mental regulation and its output including but not limited to emotional distress, perception of the self and the world, and possibly subjective quality of life beyond objective conditions. According to the model, metacognitive beliefs (i.e., beliefs about cognition) influence a person's appraisal of thoughts and feelings and judgements about whether circumstances are safe and satisfactory, or threatening and unsafe, and, importantly, how to cope with the present circumstances (Wells, 2009).

Metacognitive beliefs give rise to a maladaptive processing style named the cognitive attentional syndrome (CAS) hypothesized to be involved in the maintenance of emotional distress and psychological dysfunction in general (Wells, 2000). CAS is characterized by a negative thinking style including

rumination and worry, threat monitoring, and maladaptive coping strategies. Two types of metacognitive beliefs are especially important for the activation and maintenance of CAS. Positive beliefs about repetitive negative thinking concern the advantages of engaging in worry/rumination (e.g., “Ruminating will help me understand why I feel this way”), while negative beliefs concern the uncontrollability and corresponding dangers of worry/rumination (e.g., “I can’t stop ruminating once I start,” “Worrying will damage my brain”). Metacognitions about the uncontrollability of cognition is central to the model as they prohibit the individual from disengaging CAS which is the more proximal cause of distress and dysfunction.

In support of the metacognitive model, metacognitive beliefs are associated with perceived stress and symptoms of anxiety and depression (Cano-López, García-Sancho, Fernández-Castilla & Salguero, 2022; Capobianco, Heal, Bright & Wells, 2019; Salguero & Ramos-Cejudo, 2023; Spada, Mohiyeddini & Wells, 2008; Spada, Nikčević, Moneta & Wells, 2008) and dysfunctional metacognitive beliefs have been identified across several mental disorders (Sun, Zhu & So, 2017). Studies show that metacognitions prospectively predict symptoms of anxiety, depression and obsessive-compulsive disorder symptoms (Nordahl, Anyan & Hjemdal, 2023; Nordahl, Anyan, Hjemdal & Wells, 2022a; Sunde, Johnson, Himle *et al.*, 2021; Yılmaz, Gençöz & Wells, 2011). Moreover, research has demonstrated that the metacognitive model is replicable also in general populations (Nordahl *et al.*, 2023; Nordahl, Ødegaard, Hjemdal & Wells, 2019) and student populations (Anyan, Nordahl & Hjemdal, 2023) and thus extends beyond populations with mental disorders.

As quality of life is a multidimensional construct that spans both objective life circumstances, values, and perceived well-being (Haas, 1999) it is a different phenomenon than mere emotional states. To perceive quality of life as poor is not itself an indicator of psychological disorder or expression of psychopathology. However, studies systematically show an association between perceived quality of life and symptoms of distress both in clinical and healthy samples (Hohls, König, Quirke & Hajek, 2021).

Nonetheless, the metacognitive model predicts that psychological problems or “dysfunction” in general is related to biases in metacognition and its influence on cognitive processing style which may shape how one perceives oneself, others, and the world (Wells & Cartwright-Hatton, 2004). Hence, it would be expected that individuals who are prone to engage in CAS strategies due to biases in metacognition, will be more susceptible to have a negative perception about their present state and well-being. Therefore, dysfunctional metacognitive beliefs may be linked to perceived quality of life in a relationship mediated by CAS strategies. For example, if a person engages in rumination or self-critical dwelling concerning personal mistakes or challenges in the current life situation, this type of processing is likely to have a negative impact on subjective quality of life. Furthermore, if a person has many objective problems in their life, but uses more adaptive mental regulation strategies (e.g., disengages from negative thinking around objective problems), the subjective quality of life might be better. Hence, mental regulation, which in the metacognitive model is a function of metacognition and its influences on cognitive processing, matters to subjective quality of life. In support of this,

rumination and worry, which are part of CAS, negatively impacts quality of life in cancer patients (Li, Zhu, Yang *et al.*, 2015), depressed patients (Kuehner & Bueger, 2005) and in the general population (Rief, Glaesmer, Baehr, Broadbent, Brähler & Petrie, 2012).

Although the association between metacognitions and quality of life has received little empirical attention, some research indicates a link between the two. A systematic review by Lenzo, Sardella, Martino, and Quattropiani (2020) found an association between metacognition and quality of life among patients with chronic illness. The review found negative beliefs about worry to be an important factor across various health conditions. The authors suggested that metacognitions are important for how individuals adapt to their situation, and, moreover, that metacognitions may contribute to how an individual “makes sense” of their situation and thereby influence their perceived quality of life. A relation between metacognitions, maladaptive coping behaviors and health related quality of life has been found in patients with chronic heart failure (Ghafoor, Ahmad, Nordbeck, Ritter, Pauli & Schulz, 2019). For mental disorders, metacognitive beliefs and quality of life are related in patients with OCD, also when controlling for disorder specific symptoms and beliefs (Barahmand, Tavakolian & Alaei, 2014). Different studies report a positive association between dysfunctional metacognitive beliefs and trait-anxiety (Nordahl, Hjemdal, Hagen, Nordahl & Wells, 2019), and significant negative associations between dysfunctional metacognitive beliefs and positive outcomes such as self-esteem (Kolubinski, Marino, Nikčević & Spada, 2019), resilience and adaptive personality traits (Matthews, Panganiban, Wells, Wohleber & Reinerman-Jones, 2019; Nordahl, Ebrahimi, Hoffart & Johnson, 2022). These associations indicate that there is a role for metacognition in psychological vulnerability but also adaptation. Evidence from clinical trials evaluating metacognitive therapy (MCT; Wells, 2009) which directly targets metacognitive beliefs brings further support for a role of metacognition to quality of life as MCT is associated with improvement in quality of life among patients being treated for depression (Solem, Kennair, Hagen *et al.*, 2019), anxiety and depression in the context of cancer (Fisher, Byrne, Fairburn, Ullmer, Abbey & Salmon, 2019), prolonged grief (Wenn, O’Connor, Kane, Rees & Breen, 2019) and repetitive thinking (McEvoy, Erceg-Hum, Anderson *et al.*, 2015). MCT is also associated with improved self-confidence and self-efficacy in patients at risk of sick leave due to mental problems (Bjørndal, Giæver, Aschim *et al.*, 2022). In sum, the existing literature indicates a role for metacognitions in quality of life, and a more specific evaluation of these relationships is warranted.

The aims of the present study are twofold: (1) to investigate if the level of metacognitive beliefs is associated with perceived quality of life in persons who are not recruited based on the presence of a medical or psychiatric disorder; and (2) investigate if this association is mediated by CAS strategies. Previous research has shown a relation between metacognitions and age (Grøtte, Solem, Myers *et al.*, 2016; Spada *et al.*, 2008), gender (O’Carroll & Fisher, 2013; Spada *et al.*, 2008) (Nordahl, Anyan, Hjemdal & Wells, 2022b) and mental illness (Sun *et al.*, 2017). In addition, education is associated with mental health and quality of life (Ross & Van Willigen, 1997). Therefore, we aimed to control for the potential confounding effects between these variables (Fig. 1).

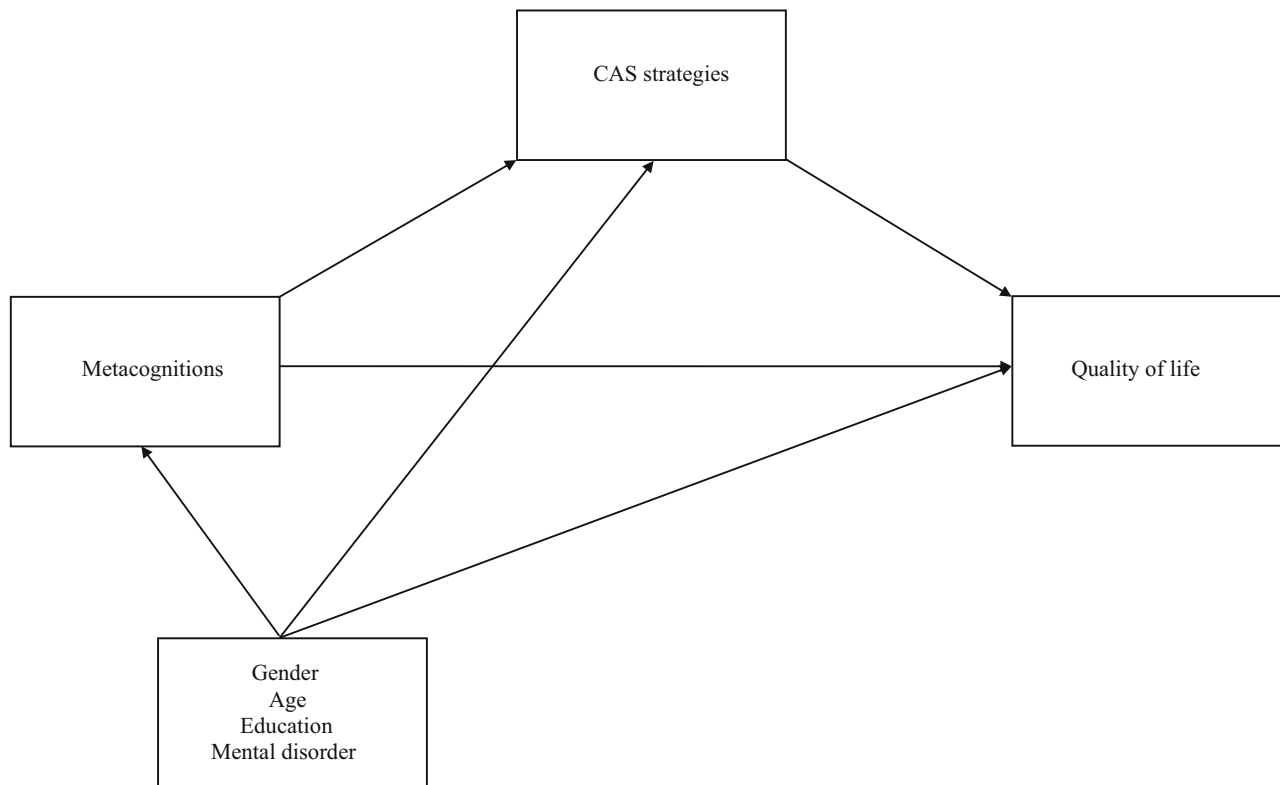


Fig. 1. A conceptual diagram of the proposed association between metacognitions, CAS and quality of life, controlling for background variables.

We hypothesize that higher levels of dysfunctional metacognitions will be associated with lower quality of life, and that the effect of metacognitions on quality of life will be mediated by the CAS.

## METHODS

### Participants and procedure

An adult sample was recruited using convenience sampling by sharing a link to the study on social media. Several mental health organizations shared the link on Facebook groups. When clicking the link, participants were forwarded to an information sheet about the study, and participants had to actively choose to consent to participate upon reading the information sheet to be forwarded to the survey. The survey was administered in *Nettskjema*, which is an online survey service by the University of Oslo, Norway. The study was approved by the Norwegian Centre for Research Data (reference: 510306). The participants reported age, gender, education, if they had ever received a diagnosis of a mental disorder, employment status and marital status. In addition, the participants completed the self-report measures described below.

A total of 503 persons consented to participate. One participant who reported gender as “other” was excluded from the data analysis as we controlled for gender as a dichotomous variable. The final sample thus included of 502 participants, of whom 387 (77.1%) were women and 115 (22.9%) men, with a mean age of 41.0 years ( $SD = 11.5$ ). Regarding highest level of education, 12 (2.4%) had elementary school, 42 (8.4%) secondary school, 50 (10.0%) had upper secondary school, 31 (6.2%) profession based secondary school, 110 (21.9%) college or university degree less than 4 years, and 257 (51.2%) had university degree of 4 years or more. In terms of history of mental disorder, 235 (46.8%) reported that they had received a diagnosis of a mental disorder at some point in their life. Three hundred and forty-six reported to be working (68.9%), 62 (12.4%) were students, 37 (7.4%) were on sick leave and 89

(17.7%) had disability pension. Regarding civil status, 344 (68.5%) were married or in a relationship and 158 (31.5%) were single.

### Measures

The Metacognitions Questionnaire 30 (MCQ-30; Wells & Cartwright-Hatton, 2004) is a self-report questionnaire with 30 items that measure metacognitive beliefs. All items are scored on a 1 (do not agree) to 4 (agree very much) Likert scale. The measure has a five-factor structure, each with a scoring range from 6 to 24 points, where higher scoring indicates higher endorsement of maladaptive metacognitions. The Norwegian version of MCQ-30 has well-established psychometric properties (Nordahl *et al.*, 2019). The internal reliability of the five factors in the present study were acceptable: (1) positive beliefs about worry (e.g. “Worrying helps me cope”),  $\alpha = 0.82$ ; (2) negative beliefs about the uncontrollability or danger of worry (e.g. “When I start worrying, I cannot stop”),  $\alpha = 0.86$ ; (3) cognitive confidence (e.g. “I do not trust my memory”),  $\alpha = 0.87$ ; (4) beliefs about the need to control thoughts (e.g. “It is bad to think certain thoughts”),  $\alpha = 0.81$ ; and (5) cognitive self-consciousness (e.g. “I monitor my thoughts”),  $\alpha = 0.78$ .

CAS-1 (Wells, 2009) is a questionnaire with 16 items that assess the cognitive attentional syndrome and metacognitions during the last week. In the present study we used the first three items of the scale as a total score and indicator of the CAS as suggested by Nordahl and Wells (2019). Item 1 concerns the frequency of rumination and worry, item 2 concerns threat monitoring (i.e., strategic attention directed towards potential internal and/or external threats), and item 3 covers unhelpful coping behaviors (e.g., avoidance, reassurance seeking and attempts to control emotions). The Norwegian translation of the CAS-1 has good psychometric properties (Nordahl & Wells, 2019). Internal consistency of the scale in the current study was good ( $\alpha = 0.89$ ).

The quality of life scale (QOLS; Flanagan, 1982) is a self-report scale that measures quality of life. Respondents are asked to rate their satisfaction with 16 areas, for example, “socializing: meeting other people, doing things,” and “understanding yourself: knowing what life is about,”

Items are scored on a 1 (very dissatisfied) to 7 (very satisfied) Likert scale. In the current study we applied the 16-item version of QOLS (Burckhardt & Anderson, 2003). The instrument has been translated to Norwegian with good psychometric properties (Wahl, Rustøen, Hanestad, Lerdal & Moum, 2004). The total QOLS score was calculated by adding the score of the items and total score ranges from 16 to 112, where higher scores equal better quality of life. Cronbach's alpha showed excellent internal consistency ( $\alpha = 0.91$ ).

Statistical analyses

Statistical analyses were performed in Mplus 8.9 (Muthén & Muthén, 1998–2023), using structural equation modelling (SEM) with robust full-information maximum likelihood (MLR). The analyses were performed in three stages. In the first stage, we performed separate analyses to find well-fitting measurement models of the latent constructs prior to estimating structural paths in the mediation model. The latent factor of quality of life was specified by the 16 items of the QOLS with two freely estimated error covariances. The latent factor of metacognitions was specified by the five MCQ-30 factors, and the latent CAS strategies factor by items 1–3 of the CAS-1. In the second stage, we estimated a full SEM with dysfunctional metacognition as the focal predictor, CAS strategies as the mediator variable and quality of life as the outcome variable (see Fig. 1). A significant mediation effect was established when the 95% confidence interval based on 1,000 bootstrap draws did not contain zero, which is preferred over traditional approaches in testing mediation (Hayes, 2009, 2013) such as the causal steps approach or the test of joint significance approach (Baron & Kenny, 1986) or the product of coefficients approach (Sobel, 1982, 1986).

In the third stage, relevant covariates (i.e., age, gender, education, and history of mental disorder) were added to the mediation model to control for their effects while testing the hypothesis that CAS strategies mediate the relationship between dysfunctional metacognition and lower quality of life over and above the covariates. Adequate model fit was evaluated with the following indices: standardized root mean square residual (SRMR) (Browne & Cudeck, 1993) and root mean square error of approximation (RMSEA) (Hu & Bentler, 1999) values below 0.08 and values equal to or less than 0.06 (upper 90% confidence interval close to or below 0.08), respectively, a comparative fit index (CFI) and a non-normed fit index (NNFI; also called the TLI) above 0.90 (Hu & Bentler, 1999). QOLS item 4 (having and raising children) was left unanswered by  $n = 149$  and item 5 (relations with spouse or significant other) was unanswered by  $n = 124$ . All other values were complete in the data. Full information maximum likelihood estimation (FIML) was used to handle missing values as this approach makes use of all available data (Schafer & Graham, 2002), therefore, missing values were not replaced.

RESULTS

Table 1 contains the means, standard deviations, and the correlation between the variables in the study.

Mediation model of dysfunctional metacognitions, CAS strategies and lower quality of life

The fit of the mediation model was acceptable ( $\chi^2 = 652.994$ ,  $df = 247$ ,  $p < 0.001$ ; SRMR = 0.05; RMSEA = 0.06 [90% CI = 0.052, 0.063]; CFI = 0.92; TIL = 0.91), so we proceeded to interpret the coefficients of the structural paths. The total effect of dysfunctional metacognition on quality of life was (standardized:  $\beta = -0.70$ ,  $p < 0.001$ ). The direct effect of CAS strategies on quality of life was ( $\beta = -0.36$ ,  $p < 0.01$ ), and from dysfunctional metacognitions to CAS strategies ( $\beta = 0.86$ ,  $p < 0.001$ ), and to quality of life ( $\beta = -0.40$ ,  $p < 0.001$ ) were all significant as was the indirect effect ( $\beta = -0.31$ ,  $p < 0.001$ ; [95% CI: -0.488,

Table 1. Table of means, standard deviations, and correlations ( $N = 502$ )

Variable	Mean	SD	2	3	4	5	6	7	8	9	10	11	12	13
1 MCQ-30 CC	10.82	4.13	0.23**	0.45**	0.44**	0.28**	0.37**	0.33**	0.38**	-0.40**	0.01	-0.14**	-0.31**	0.24**
2 MCQ-30 CSC	13.05	3.87	0.52**	0.48**	0.48**	0.35**	0.45**	0.45**	0.46**	-0.22**	-0.03	-0.13**	-0.24**	0.26**
3 MCQ-30 NEG	12.02	4.68	0.71**	0.36**	0.71**	0.36**	0.72**	0.67**	0.67**	-0.58**	0.07	-0.15**	-0.45**	0.48**
4 MCQ-30 NC	9.10	3.52	0.45**	0.45**	0.45**	0.45**	0.56**	0.58**	0.59**	-0.53**	-0.02	-0.25**	-0.44**	0.36**
5 MCQ-30 POS	8.72	2.90	0.41**	0.41**	0.41**	0.41**	0.41**	0.33**	0.34**	-0.34**	0.00	-0.23**	-0.19**	0.44**
6 CAS 1 Worry/rumination	3.31	2.31						0.82**	0.73**	-0.59**	0.11*	-0.22**	-0.39**	0.24**
7 CAS 2 Threat monitoring	2.46	2.29						0.71**	0.71**	-0.55**	0.13**	-0.20**	-0.40**	0.45**
8 CAS 3 Coping behaviors	1.91	1.62								-0.55**	0.05	-0.23**	-0.43**	0.52**
9 QOLS	86.9	13.5									0.01	0.24**	0.41**	-0.42**
10 Gender (Females)	41.01	11.5										-0.10*	0.08	0.07
11 Age													0.06	-0.08
12 Education														-0.37**
13 Mental disorder														

Notes: MCQ-30 = metacognitions questionnaire 30; CC = cognitive confidence; CSC = cognitive self-consciousness; NEG = negative metacognitive beliefs; NC = need to control thoughts; POS = positive metacognitive beliefs; QOLS = quality of life scale total sum score; mental disorder = history of mental disorder (yes). Correlation coefficients are Pearson for numeric variables and Spearman's rho for correlations with gender, education and mental disorder.

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

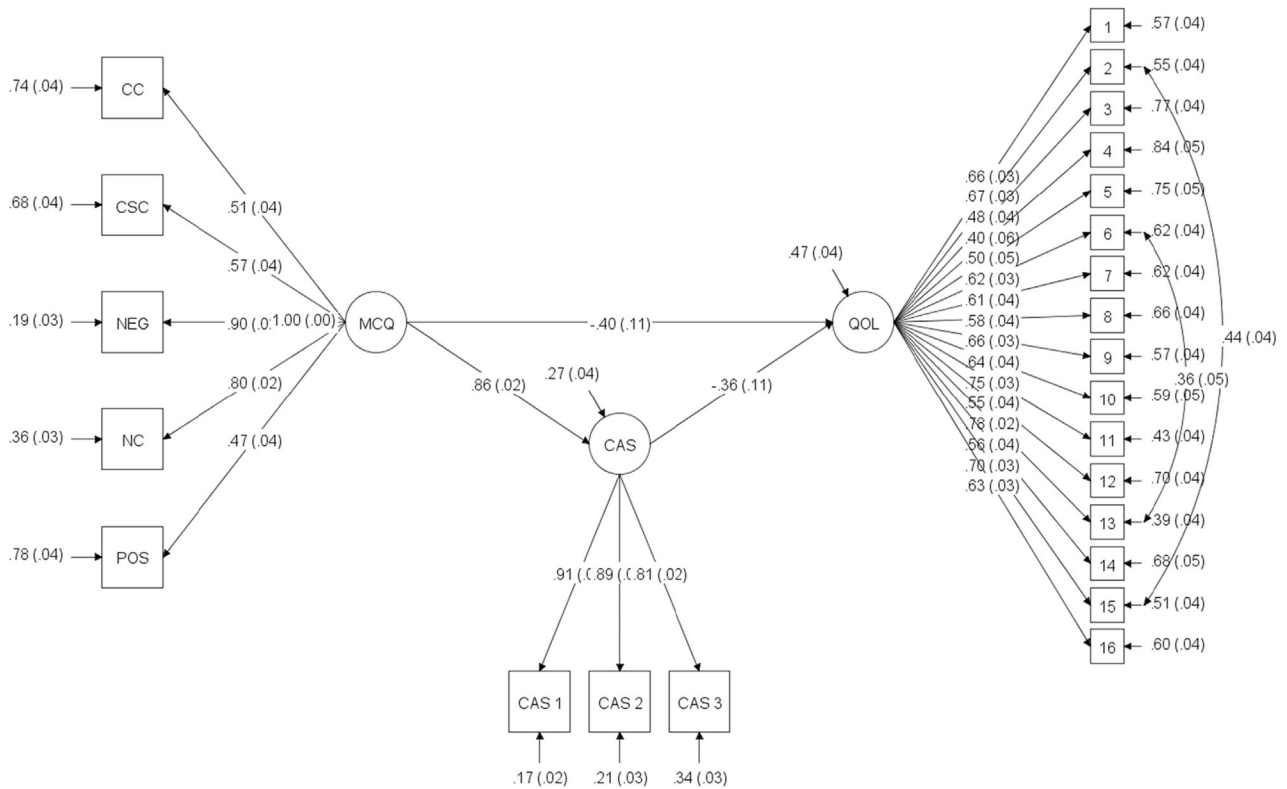


Fig. 2. Structural equation model of the relationship between latent factors of the MCQ-30, CAS-1 and QOLS. All estimates are standardized. Ellipses represent latent variables and rectangles represent indicator variables. CC = cognitive confidence; CSC = cognitive self-consciousness; NEG = negative metacognitive beliefs; NC = need to control thoughts; POS = positive metacognitive beliefs; CAS 1 = worry/rumination; CAS 2 = threat monitoring; CAS 3 = maladaptive coping behaviors; QOL = quality of life.

-0.127]), whose confidence interval did not contain zero. This means that the association between dysfunctional metacognition and lower quality of life can also in part be explained by the fact that dysfunctional metacognition is associated with greater use of CAS strategies, which in turn is associated with lower quality of life. The model is displayed in Fig. 2.

*Effects of relevant covariates in the mediation of dysfunctional metacognitions and quality of life by CAS strategies*

Relevant covariates were added to the mediation model to examine whether when controlling for known covariates, dysfunctional metacognitions would still predict the CAS strategies and lower quality of life. Table 2 contains all path coefficients from the mediation model with relevant covariates included. Having a history of mental disorder predicted higher levels of dysfunctional metacognitions and greater use of CAS strategies. Higher age and level of education predicted lower levels of dysfunctional metacognitions. Both higher levels of education and females reported greater quality of life.

The total effect of dysfunctional metacognition on quality of life was ( $\beta = -0.58, p < 0.001$ ). The direct effect of CAS strategies on quality of life was ( $\beta = -0.33, p < 0.01$ ), and from dysfunctional metacognitions to CAS strategies ( $\beta = 0.77, p < 0.001$ ), and to quality of life ( $\beta = -0.33, p < 0.01$ ) were all significant as was the indirect effect ( $\beta = -0.25, p < 0.01$ ; [95% C I: -0.416, -0.087]), whose confidence interval did not contain zero. Thus, when controlling for known covariates, the effect that

Table 2. Path coefficients for relevant covariates in the full SEM

Path	$\beta$	SE	p
<b>Dysfunctional metacognitions</b>			
Gender (Females) →	0.02	0.04	0.664
Age →	<b>-0.18</b>	<b>0.04</b>	<b>0.000</b>
Education →	<b>-0.32</b>	<b>0.05</b>	<b>0.000</b>
Psychological disorder →	<b>0.38</b>	<b>0.04</b>	<b>0.000</b>
<b>CAS strategies</b>			
Dysfunctional metacognitions →	<b>0.77</b>	<b>0.04</b>	<b>0.000</b>
Gender (Females) →	0.04	0.03	0.188
Age →	-0.05	0.04	0.145
Education →	-0.04	0.04	0.262
Psychological disorder →	<b>0.10</b>	<b>0.04</b>	<b>0.007</b>
<b>Quality of life</b>			
Dysfunctional metacognitions →	<b>-0.33</b>	<b>0.11</b>	<b>0.003</b>
CAS strategies →	<b>-0.33</b>	<b>0.11</b>	<b>0.002</b>
Gender (Females) →	<b>0.07</b>	<b>0.03</b>	<b>0.033</b>
Age →	0.04	0.04	0.272
Education →	<b>0.12</b>	<b>0.04</b>	<b>0.006</b>
Psychological disorder →	-0.08	0.04	0.060

Note: Statistically significant paths are shown in bold.

dysfunctional metacognitions have on lower quality of life is still in part explained by greater use of CAS strategies.

DISCUSSION

The aims of the present study were to investigate the relationships between metacognitive beliefs and quality of life, and to investigate

if CAS strategies mediated this association, also when controlling for relevant background variables. Structural equation modelling showed a direct effect between metacognitions and quality of life, where a higher degree of dysfunctional metacognitions was associated with lower quality of life. The effect of metacognitions on quality of life via CAS strategies was significant, providing evidence that CAS strategies partly mediated the association between metacognitions and quality of life.

The negative association between metacognitions and quality of life indicates that individuals who have higher levels of dysfunctional metacognitive beliefs also experience a reduced quality of life. The results are in line with a review of studies investigating the association between metacognitions, psychological symptoms and quality of life in patients with chronic health conditions (Lenzo *et al.*, 2020). Moreover, the association between metacognitions and quality of life is supported by findings from clinical trials of MCT, which directly modify metacognitive beliefs, that show improved quality of life across diagnostic groups (Fisher *et al.*, 2019; McEvoy *et al.*, 2015; Solem *et al.*, 2019; Wenn *et al.*, 2019).

The positive relationship found between metacognitions and CAS strategies is expected in accordance with metacognitive theory (Wells, 2009), and shows that more dysfunctional metacognitive beliefs are associated with increased use of preservative thinking styles like excessive worry and rumination, more threat monitoring and use of maladaptive coping behaviors. Furthermore, the negative association between CAS strategies and quality of life indicates that persons who engage in unhelpful mental regulation strategies report a lowered quality of life. These results support metacognitive theory, which suggests that more use of maladaptive processes like rumination and worry leads to more emotional distress and psychological problems in general (Wells & Matthews, 1994). The results corroborate previous studies that found an association between CAS strategies such as rumination and repetitive thinking with quality of life in both clinical and non-clinical samples (Kuehner, 2003; Li *et al.*, 2015; Rief *et al.*, 2012).

We found CAS strategies to mediate the association between metacognitive beliefs and quality of life. The results are partly in line with a study that found metacognitive beliefs and rumination to mediate the association between emotion intelligence and health related quality of life in patients with chronic heart failure (Ghafoor *et al.*, 2019). However, the characteristics of the study participants differed from our study, and the authors treated metacognitive beliefs as a mediator, whereas in the current study CAS was used as a mediator. The possible mediating effect of CAS strategies on quality of life should therefore be replicated in other populations.

There is some indication that for some mental disorders quality of life may continue to be lowered even if symptoms are reduced (Bystritsky, Saxena, Maidment, Vapnik, Tarlow & Rosen, 1999), which have led authors to suggest that additional interventions aimed specifically at improving quality of life are needed (Barahmand *et al.*, 2014). However, as studies find that MCT reduces symptom severity and improves quality of life (Fisher *et al.*, 2019; Fisher, Byrne & Salmon, 2017; Solem *et al.*, 2019), our study suggests that therapeutic work aimed at the metacognitive level may lead to improved quality of life due to the association demonstrated between metacognitions, CAS strategies and quality of life.

The association between metacognitions and quality of life was significant also when controlling for a history of mental disorder. History of mental disorder was positively associated with both metacognitions and CAS strategies, and negatively associated with quality of life. This finding is in line with a study showing a relation between metacognitive beliefs and quality of life in patients with OCD, also when controlling for disorder specific symptoms (Barahmand *et al.*, 2014). However, in the latter study only beliefs about the need to control thoughts and cognitive self-consciousness were associated with overall quality of life, whereas we found significant correlations between all MCQ-30 subscales and quality of life. A possible reason that different metacognitive factors were associated with quality of life in the two studies is that specific metacognitive beliefs like cognitive self-consciousness may be more salient in persons with OCD (Exner, Kohl, Zaudig, Langs, Lincoln & Rief, 2009). This indicates that different metacognitions may be important for the perceived quality of life in different samples according to sample-specific characteristics. CAS is likely to impact on quality of life across samples, but different metacognitive beliefs may underlie CAS. For example, patients with OCD are prone to monitor their minds (i.e., CAS) for obsessive thoughts, while patients with depression often present with lower awareness of thoughts and cognitive style even though they substantially engage in difficult to control rumination (i.e., CAS; Wells, 2009). The participants in the present study were not recruited based on the presence of a specific mental disorder, which may partly explain the difference in results.

The analysis included covariates that may be associated both with metacognitions and quality of life. Women reported somewhat higher quality of life than men, which was also reported in the initial validation of the QOLS (Burckhardt & Anderson, 2003), however, the effect was small and shows that metacognitive beliefs and CAS strategies were more important for the perceived quality of life. Higher level of education was associated with improved quality of life, which is in line with previous findings (Patrício, Jesus, Cruice & Hall, 2014), and this finding corroborates previous studies that show that education is a protective factor to mental distress (Bjelland, Krokstad, Mykletun, Dahl, Tell & Tambs, 2008). Younger participants reported more dysfunctional metacognitions, which also corroborates previous findings (Anyan, Hjemdal & Nordahl, 2022; Grøtte *et al.*, 2016; Spada *et al.*, 2008). Higher age and education thus appear to be protective factors to dysfunctional metacognitive beliefs. There was no association between age and quality of life which is in line with some previous research (Fassio, Rollero & De Piccoli, 2013; Wahl *et al.*, 2004), although others did find an association (Patrício *et al.*, 2014). However, the significant effect of metacognitions and CAS strategies on quality of life also when controlling for these background variables, indicates the importance of the metacognitive variables for quality of life beyond demographic variables and mental disorder.

The findings of the current study are of relevance for theoretical approaches to quality of life. In their theoretical framework of quality of life, Cummins (2005) suggest an affective-cognitive homeostatic system responsible for the regulation of core affect. However, the metacognitive model has over the years gained a lot of empirical support as a basis to understand and treat emotional disorders and psychological dysfunction (Wells, 2019) and might serve as a framework for the

intrapyschic factors relevant to understanding individual differences in quality of life beyond objective influences. Hence, further research on quality of life should consider including metacognitive factors in a pursue of better knowledge.

It must be noted that about 47% of the sample reported to ever have been diagnosed with a mental disorder, which is higher than the estimated prevalence of 15.3% (Knudsen, Stene-Larsen, Gustavson *et al.*, 2021). However, our results may reflect that we did not differentiate between current or history of mental illness in the survey. Nevertheless, the mean QOLS score of 86.9 ( $SD = 13.5$ ) was somewhat higher than what has been reported in the Norwegian general population in previous research (mean = 84.1,  $SD = 12.5$ ) (Wahl *et al.*, 2004).

This study has possible clinical implications. By challenging and changing dysfunctional metacognitive beliefs, therapists may impact on subjective quality of life by, for example, helping clients to experience thoughts in a new “mode” where they are experienced as events in the mind rather than objective truths which may change how one experiences the self, others, and the world in general. Since what represents improved quality of life is highly idiosyncratic, it is apparent that quality of life is not a judgment about objective measures, but instead is the reflection of an individuals’ perceived state, compared to expectations, and to a large extent influenced by the person’s way of viewing the world. Effective mental regulation dependent on metacognition may buffer the relationship between objective life circumstances and subjective quality of life in this way. More use of CAS strategies such as threat monitoring, repetitive and negative thinking processes, and unhelpful coping strategies are likely to backfire and prolong negative inferences.

### Limitations

The results of this study may be compromised by spurious effects because of the cross-sectional design, and there is a need for future studies with prospective design to investigate the causal relationship between the variables studied. The sample was recruited by convenience sampling via Facebook and was largely dominated by women, which are major limitations that affect the generalizability of the results. Moreover, mental health organizations participated in spreading the invitation link, which may have led to oversampling participants who had ever been diagnosed with a mental disorder. The results may therefore not be generalizable to the general population and populations with lower prevalence of mental illness. However, the association found between metacognitions and quality of life may be relevant for subclinical populations who have a higher severity of psychological symptoms than the general population. Future studies should aim to recruit clinical or non-clinical populations separately to investigate this issue. A large proportion of the sample left QOLS item 4 (having and raising children; 149 missing values) and item 5 (relations with spouse or significant other; 124 missing values) unanswered. This finding is assumed to reflect that a significant proportion of the sample did not have children or a partner, which may have impacted on the results. However, a similar response pattern has been reported in other studies (Liedberg, Burckhardt & Henriksson, 2005).

### CONCLUSION

According to metacognitive theory, there is reason to expect that dysfunctional metacognitive beliefs and more use of CAS strategies are associated with lower quality of life. By using structural equation modelling the present study found that higher severity of metacognitive beliefs was associated with lower quality of life. Furthermore, this association was partly mediated by use of CAS strategies and these relationships were significant also when controlling for age, gender, education, and history of mental disorder. The study offers further support to the metacognitive model of psychological disorder and broadens the scope of research by investigating quality of life as a separate construct. Further studies should employ a prospective design and also test these relationships in more specific samples.

### CONFLICT OF INTEREST

All authors declare no conflict of interest.

### DATA AVAILABILITY STATEMENT

The datasets analysed during the current study are available from the corresponding author on reasonable request.

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