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Coping as a mediator between locus of control, competence beliefs, and mental health: A systematic review and structural equation modelling meta-analysis

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ABSTRACT

Objective: This systematic review and two-staged structural equation modelling meta-analysis (TSSEM) aimed to examine whether coping mediates the associations between locus of control, competence beliefs, and mental health in the general population and clinical samples.
Methods: Eligible studies published until May 2017 were identified through systematic searches of PubMED and EMBASE. The review included 19 studies and the meta-analysis 15 studies.
Results: The review supports the assumption that coping mediates the associations between locus of control and competence beliefs, and mental health. TSSEM using a pooled sample of 3986 respondents and 225 cross-sectional effect sizes indicated that maladaptive coping mediates the association between maladaptive locus of control and mental health problems. On the contrary, adaptive coping did not mediate this association and was only significantly associated with competence beliefs and adaptive locus of control but, unexpectedly, not with mental health. Both maladaptive and adaptive locus of control but not competence beliefs had direct links to mental health problems that were independent of coping.
Conclusion: Interventions should not only focus on enhancing adaptive coping as it might be more promising to diminish maladaptive locus of control, which may result in reduced maladaptive coping and, finally, improved mental health.

1. Introduction

In 2010, approximately 38.3% of the European Union's citizens had mental disorders (e.g., depression or anxiety) (Wittchen et al., 2011). Mental disorders are ranked as major causes of disability-adjusted life years. They cause high direct and indirect costs partly because they increase the risk of comorbidity and jeopardise quality of life (QoL) (Morton et al., 2017; Murray & Acharya, 1997; Whiteford et al., 2013; World Health Organization, 2014, 2017). Consequently, to prevent a chronic course and maintain satisfactory QoL, there is a need for interventions targeting factors associated with multiple mental disorders (World Health Organization, 2017). Thus, a better understanding of the interplay of risk and preventive factors associated with poor and good mental health, respectively, to optimise interventions is a core health

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challenge of the 21st century (Wittchen et al., 2011).

Competence beliefs and locus of control have been emphasised in numerous cross-sectional and longitudinal studies as risk factors to and promotors of mental health (Cheng, Cheung, Chio, & Chan, 2013; Heffer & Willoughby, 2017; Mann, Hosman, Schaalma, & de Vries, 2004; Sowislo & Orth, 2013; Stiles-Shields, Corden, Kwasny, Schueller, & Mohr, 2015; Tiggemann, Winefield, Winefield, & Goldney, 1991; Yeoh, Tam, Wong, & Bonn, 2017). Competence beliefs comprise self-efficacy and self-esteem. Self-efficacy is defined as an individual's generalised beliefs about his or her own competencies in dealing with all kinds of demands that influence how the individual thinks, feels, and acts (Benight & Bandura, 2004); self-esteem is generally regarded as the evaluation of the self and the affection individuals have for themselves (Brown & Dutton, 1995). Locus of control refers to the degree to which individuals believe they have control over events in their lives (Rotter, 1966). While an adaptive locus of control represents the habitual tendency to explain positive events with internal causes and negative events with external causes (i.e., caused by powerful others or by chance/the situation), a maladaptive locus of control represents the opposite beliefs, that is, positive outcomes are caused by external causes and negative outcomes are caused by internal causes (Muldoon, Lowry, Prentice, & Trew, 2005).

Coping is another construct that predicts a broad range of mental health outcomes over time (Heffer & Willoughby, 2017; Thompson, Fiorilla, Rothbaum, Ressler, & Michopoulos, 2018), playing an important role in the relationship between stress and the onset of mental disorders (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Kessler et al., 2010; McLaughlin, 2016; Murray, Ehlers, & Mayou, 2002). It is defined as an individual's constantly changing cognitive and behavioural effort to manage specific external and/or internal demands appraised as taxing or exceeding the person's resources (Lazarus, 1966). Previous work attempted to classify coping strategies into two basic dimensions: maladaptive coping, including avoidant and emotion-oriented strategies as risk factors for poor mental health (Lee, Nezu, & Nezu, 2014; Macneil, Esposito-Smythers, Mehlenbeck, & Weismoore, 2012; Mohr et al., 2014; Suls & Fletcher, 1985), and adaptive coping, including problem-focused and active strategies as promoters of good mental health (Griva & Anagnostopoulos, 2010; Schwarzer & Schwarzer, 1996; Thorne, Andrews, & Nordstokke, 2013).

Several theoretical models and theories, such as the transactional model of stress (Lazarus & Folkman, 1984), social-cognitive theory (Bandura, 1986), and control theory (Rotter, 1966) suggest that coping is a crucial construct to explain the associations found between competence beliefs as well as locus of control and mental health. According to these theoretical models, locus of control (in terms of an individual's perception of the demands of a situation and the perceived availability of control and resources) determines the choice of coping strategies for meeting those demands, which, in turn, affects an individual's mental health. This means that individuals reporting high levels of competence beliefs (self-efficacy and self-esteem) and an adaptive locus of control are more likely to view difficult tasks as challenges rather than things to be avoided. Thus, they are more likely to use adaptive instead of maladaptive coping strategies, experience less distress, and, consequently, report fewer mental health problems (Bandura, Pastorelli, Barbaranelli, & Caprara, 1999; Brand, Laier, & Young, 2014; Cawood & Huprich, 2011; Follette & Jacobson, 1987; Garber & Hilsman, 1992; Lefcourt, 1976; Yeoh et al., 2017). In line with these assumptions, longitudinal studies found that coping is predicted by competence beliefs as well as locus of control (Aspinwall & Taylor, 1992; Heffer & Willoughby, 2017) and predicts mental health outcomes (Heffer & Willoughby, 2017). Longitudinal studies controlling for reciprocal effects between model-variables even suggest that coping and competence beliefs rather predict mental health outcomes than vice versa (Heffer & Willoughby, 2017; Orth, Robins, Widamann, & Conger, 2014; Sowislo & Orth, 2013). However, a few cross-sectional studies also found that adaptive coping strategies may trigger both high levels of competence beliefs and adaptive locus of control, presenting enduring vulnerability factors for the development of mental health problems (Fryer, Waller, & Kroese, 1997; Paterson et al., 2011; Thorne et al., 2013).

Accordingly, there is a clear need for a better understanding of the complex interplay of locus of control, competence beliefs, and coping as preventive and risk factors on mental health. In particular, this study aimed (1) to investigate the interrelationships between these factors and the relative strength of their associations with mental health by including them in one model simultaneously, (2) to examine the differential effects of these constructs by categorising them into adaptive and maladaptive coping and locus of control, and (3) to test a rival directional hypothesis by model comparison. Given that these factors have already been targeted successfully in current psychological interventions (Kendall et al., 2016, 2017), this study intends to identify the most worthwhile intervention targets and may thereby help to optimise current treatments (Schmidt & Schimmelmann, 2015). We thus systematically reviewed the literature, synthesized findings, and conducted a two-staged structural equation modelling meta-analysis (TSSEM) of the associations between coping, locus of control, competence beliefs, and mental health in general population and clinical samples. Based on the theoretical background and empirical evidence described above, we proposed the following two mediation models. Hypothesis 1: Coping mediates the association between locus of control as well as competence beliefs and mental health (mediation model 1). Hypothesis 2: As some studies suggested the reverse sequence, we additionally tested the alternative directional hypothesis positing that competence beliefs and locus of control function as parallel mediators of the association between coping and mental health (mediation model 2) (see Fig. 1).

2. Method

This meta-analysis was performed according to the PRISMA recommendations (Moher, Liberati, Tetzlaff, & Altman, 2009).

2.1. Inclusion and exclusion criteria

Inclusion and exclusion criteria for eligible articles were specified and documented in advance by NG and SJS (see Appendix A). First, studies had to investigate (a) coping as a mediator of the relationship between competence beliefs or locus of control and mental health or (b) locus of control or competence beliefs as a mediator of the relationship between coping and mental health. Second, the samples had to consist of general population and/or clinical samples as we were interested in the relevance of competence beliefs, locus of control, and coping for both the development of mental disorder (i.e. general population samples including individuals with subclinical symptoms) but also the persistence of mental disorders (i.e. clinical samples). Third, studies had to analyse mediation effects using regression analysis, path analysis, or structural equation modelling as the most appropriate method to test for mediation (Frazier, Tix, & Barron, 2004). Fourth, studies had to provide correlation coefficients between model variables or other statistics that could be converted into correlation coefficients (Peterson & Brown, 2005) necessary for the calculation of the pooled path coefficients. Studies were excluded if they included physically ill or intellectually disabled individuals. As we were interested in naturally occurring interrelations, we decided to further exclude experimental studies, clinical trials, and other intervention studies. In addition, case reports and studies published only as abstracts were excluded (see Appendix A for more details).

2.2. Search strategy

The electronic bibliographic databases EMBASE and PubMed were searched by NG for potentially relevant articles published until May 2017. The search terms incorporated a combination of keywords and

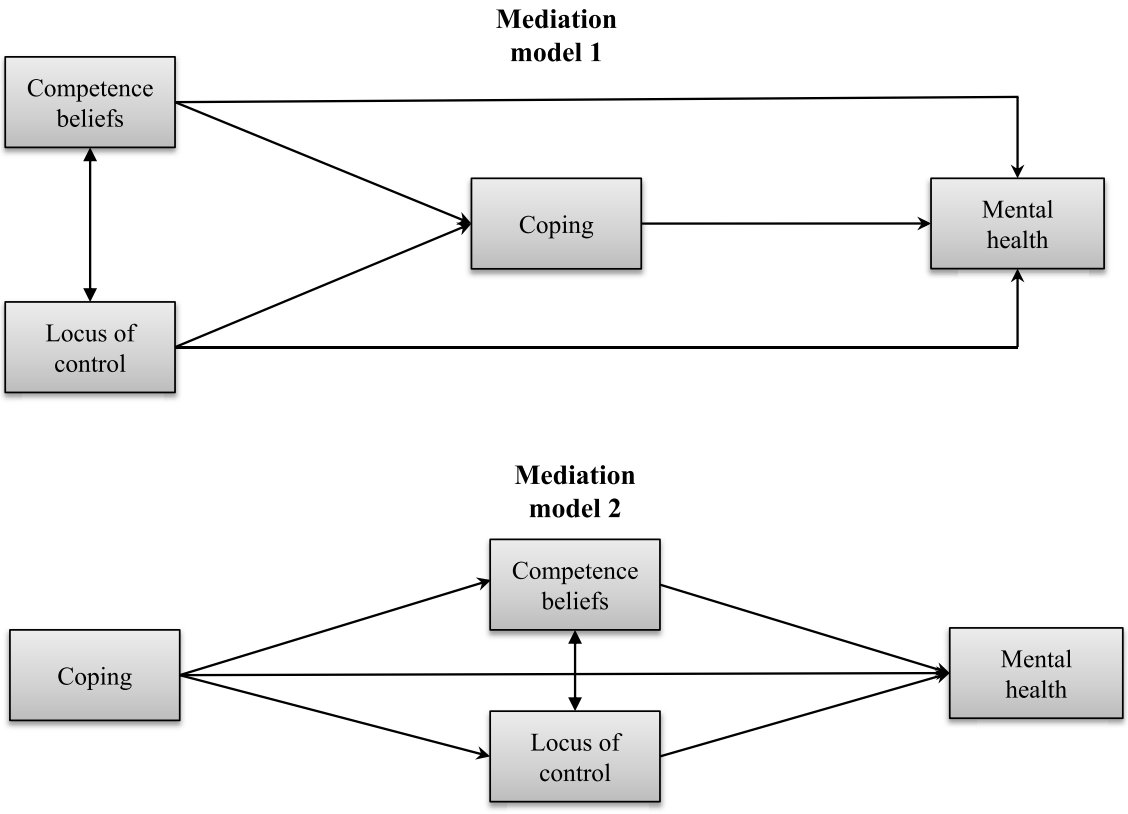

Fig. 1. The hypothesized mediation model (1) and the alternative mediation model (2).

Medical Subject Headings (MeSH terms) including coping AND locus of control OR self-efficacy AND mental health (see Appendix B for a detailed description of the search strategy and keywords). The search was limited to peer-reviewed journals published in English or German. Finally, reference lists of included articles for potential additional articles were inspected.

2.3. Coping domains

Coping strategies were classified as adaptive and maladaptive (Folkman & Lazarus, 1988; Janke, Erdman, Kallus, & Ising, 1997). Adaptive coping included (1) cognitive efforts to detach oneself and/or minimise the significance of the situation; (2) emotional efforts to gain distraction, other satisfaction, comforting thoughts, or relaxation; and (3) active or problem-focused efforts to alter the situation with an analytic approach to solve the problem such as trying to take control over the situation. Maladaptive coping contained deficient problem-solving patterns, such as rumination and resignation (e.g., becoming preoccupied with worrying about what to do), avoidance, denial, impulsivity, carelessness, substance misuse, aggressive behaviour, and self-pity. Ambiguous coping strategies were defined by seeking social support, which seems to depend on the specific situation and cannot be categorised upfront to either adaptive or maladaptive coping. These were classified as adaptive or maladaptive considering the respective theoretical context and assessments (see Appendix C for detailed classification of the items).

2.4. Competence beliefs

The definition of competence beliefs was based on the definitions provided by Bandura (1993), Krampen (1991), and Sandler (2000). Competence beliefs were divided into a person's generalised (1) expectations about his or her own competencies ("self-efficacy"), (2) satisfaction about his or her own competencies regarding problems in the past and anticipated effectiveness in handling future problems ("coping self-efficacy"), and (3) evaluations of the self ("self-esteem") (see Appendix C for detailed classification of the items).

2.5. Locus of control

In line with the definition of Muldoon et al. (2005), two composite locus-of-control variables were created: adaptive locus of control, which reflects the tendency to attribute positive events internally and negative events externally, and maladaptive locus of control, which reflects the opposite attribution tendency (see Appendix C for detailed classification of the items).

2.6. Mental health

One composite dependent variable was formed for mental health. It was generated by the severity of all clinical and subclinical symptoms of any mental disorder (see Appendix C for detailed classification of the items). Thus, a higher score indicates poorer mental health in terms of experiencing more mental health problems.

2.7. Study selection and coding of studies

First, duplicates of abstracts were excluded by NG. Second, all titles and abstracts that met the search criteria were screened, and the remaining full texts were consulted to determine final eligibility. The eligibility of each paper was discussed by NG and SJS until consensus was reached. NG and NS independently applied a standardised coding system to every included study. The intra-class correlation coefficients, indicating interrater reliability, ranged from 0.90 to 1.00, showing very good agreement (Cicchetti et al., 2006). To discuss coding discrepancies, NG and NS met with SJS until consensus was reached. The original authors were contacted whenever required quantitative statistics were missing. For each study, the following descriptive data

information were extracted: general study information (author, country, year of publication), sample characteristics (total sample size and number of participants included in analysis, type of sample, mean age, and gender), study design (cross-sectional or longitudinal with follow-up), theoretical background, and key results of the interactions (mediation analyses). Moreover, studies were coded for the measurement and classification of type of coping, locus of control, competence beliefs, and mental health (scales/items and type of report, e.g., self-report or parent report) and the applied statistical procedures (e.g., type of analysis, adjustment for covariates). The effect sizes (Pearson's correlation coefficients of relevant associations) were coded. Finally, the quality of reporting was rated in accordance with the STROBE statement with a higher number of reported items representing a higher quality score (Von Elm et al., 2007).

2.8. Pooling effect sizes in each study

Available correlation coefficients between the variables of interest were extracted and pooled for each study separately to produce correlation coefficients as effect sizes for adaptive and maladaptive coping, adaptive and maladaptive locus of control, competence beliefs, and mental health (see Appendix C for detailed classification of the items). Positive values indicate a positive relationship between two variables (e.g., higher competence beliefs were associated with more severe mental health problems). If a study reported more than one effect size within the same effect domain, effect sizes were averaged (weighted by sample size) using the Comprehensive Meta-Analysis Software 2.2 (Borenstein, Hedges, Higgins, & Rothstein, 2005). The resulting correlation matrix among aggregated estimates of adaptive and maladaptive coping, adaptive and maladaptive locus of control, competence beliefs, and mental health as well as the sample sizes of each study were used for further statistical analyses.

2.9. Meta-analytic structural equation modelling

Meta-analytic structural equation modelling (MASEM) was applied. To test our hypothesized mediation model 1 (coping as mediator) and the alternative mediation model 2 (adaptive and maladaptive locus of control and competence beliefs as mediators) specifically, TSSEM (Cheung & Chan, 2005; Jak, 2015) was conducted. In the first stage, the correlation matrices of each study were combined into one synthesized meta-analytically derived correlation matrix. Case-wise missing data, mainly owing to studies reporting only parts of associated correlations between the variables of interest, were treated with the omitted variables approach (Jak & Cheung, 2018a). Fixed effects TSSEM was calculated as it has greater statistical power in small (study) samples than random effects models (Schmidt, Oh, & Hayes, 2009). In the second stage, the structural equation model (SEM) was fitted to the pooled correlation matrix using weighted least squares (WLS) estimation. We started with estimating a saturated model including all direct and indirect paths (see results, Table 3). Afterwards, the smallest insignificant path was eliminated, that is, set to zero (see results, Fig. 3). Model fit was determined based on a Chi square test (χ^2, $p > .05$), Comparative Fit Index (CFI, ≥ 0.95), Tucker-Lewis index (TLI, ≥ 0.95), Root-Mean-Square Error of Approximation (RMSEA, ≤ 0.05), and p-value ($p > .05$) (Bentler, 1990, 1992; Steiger, 1990; Tucker & Lewis, 1973). In addition, the significance of indirect effects using Likelihood-based confidence intervals was tested (see Results, Fig. 4). All statistical analyses were carried out with the R-Package metaSEM 0.9.14 (Cheung, 2015); the complete R code and output are available in the Online Supplement 1.

3. Results

3.1. Selection and inclusion of studies

Overall, both titles and abstracts of 11356 potentially eligible abstracts were screened. Following screening, 210 full-text articles were assessed, and a total of 19 studies met criteria to be included in this systematic review. Reasons for exclusion are summarized in the PRISMA flowchart (see Fig. 2). All but two studies ($k = 17$, 89%) included general population samples, two studies (11%) clinical samples. Five studies (26%) applied a longitudinal design, 14 (74%) a cross-sectional design.

Most studies ($k = 11$, 58%) identified coping as a significant mediator between competence beliefs, locus of control, and mental health (Backer-Fulghum, Patock-Peckham, King, Roufa, & Hagen, 2012; Brand et al., 2014; Dieserud, Røysamb, Ekeberg, & Kraft, 2001; Griva & Anagnostopoulos, 2010; Halvarsson-Edlund, Sjödén, & Lunner, 2008; Lopez & Little, 1996; Pérez, Little, & Henrich, 2009; Shikai et al., 2007; Tomaka, Morales-Monks, & Shamaley, 2013; Wegmann & Brand, 2016; Weigold & Robitschek, 2011). Four studies (21%) could not provide support for the mediating role of coping (Benight et al., 1999; Chan, 2012; Martyn-Nemeth, Penckofer, Gulanick, Velsor-Friedrich, & Bryant, 2009; Sandler, Kim-Bae, & MacKinnon, 2000). One study (5%) showed that coping and competence beliefs may mediate the relationship between locus of control and mental health (Muris, Schmidt, Lambrichs, & Meesters, 2001). Moreover, three cross-sectional studies (16%) found support for a mediation effect through competence beliefs between coping and mental health (Fryer et al., 1997; Paterson et al., 2011; Thorne et al., 2013) (see Table 1 for the key findings of included studies).

With regard to the five longitudinal studies, all but one (Benight et al., 1999) found evidence for a mediation effect through coping. The one exception (Benight et al., 1999) reported that lower coping self-efficacy was significantly associated with more avoidant coping but not active coping. However, only active coping was significantly related to psychological distress up to 12 months after the experience of a natural disaster. No indirect effects were reported. The other four longitudinal studies indicated that an adaptive locus of control (internal control for positive events) and competence beliefs (self-esteem) were significantly associated with anxiety (Lopez & Little, 1996; Weigold & Robitschek, 2011), depression (Pérez et al., 2009), and eating problems (Halvarsson-Edlund, 2018). This association was mediated through adaptive (Weigold & Robitschek, 2011) and maladaptive coping (Halvarsson-Edlund, 2018; Lopez & Little, 1996). One study (Pérez et al., 2009) identified gender as a relevant moderator because the association between adaptive locus of control and depressive symptoms six months later was mediated through adaptive coping in females but not males. Interestingly, both longitudinal studies that assessed independent variable, mediator and dependent variable at three different assessment-points (Pérez et al., 2009; Weigold & Robitschek, 2011) to assure the required time order (Schmidt & Schimmelmann, 2015) supported the mediation effect through coping.

Similar result patterns were also found in one of two studies including clinical samples (Dieserud et al., 2001; Paterson et al., 2011). In this study (Dieserud et al., 2001) comprising in- and outpatients with and without a history of suicide attempt, adaptive coping mediated the association between high levels of competence beliefs (self-esteem and self-efficacy) and less suicide attempts. The second study (Paterson et al., 2011) investigated in a sample of inpatients with a diagnosis of anorexia nervosa and non-clinical controls whether the association between maladaptive coping and eating psychopathology was mediated by self-esteem. While the mediation effect could be confirmed in the clinical sample, in the non-clinical sample self-esteem only mediated the effect between problem orientation but not actual problem solving behaviour and eating pathology.

Table 1
Key findings and characteristics of studies included in the meta-analysis (n = 15) and systematic review (n = 19).

Author, year, country	Sample size, % male, population (GP, IP, OP)	Mean age (SD)/range	Study design & method	Competence beliefs variable/s	Locus of control variable/s, LOC	Coping variables, CO	Dependent variable/s, mental health, MH	Theoretical background	Key findings
Backer-Fulghum et al., 2012, USA	405 60%, GP, student-sample	19.96 (2.66)	SEM & CS	SEST		*Maladaptive CO* drinking alcohol	Alcohol related problems	Stress dampening model	**Maladaptive CO and stress mediated the association between SEST and MH.** *Further predictors: Parental neglectfulness, parental bonding.* More SEST was associated with less stress a^1 = **-.42*****, more stress was associated with more maladaptive CO a^2 = **.32*****, maladaptive CO was associated with more MH problems b = **.63*****. More SEST was found to be indirectly linked to fewer MH problems through fewer feelings of stress and less maladaptive CO, the indirect effect was significant: β = **−.06**, 95% CI [−.09, −.04]. Goodness of fit indices $\chi^2_{(26)}$ = 24.88, p = .53, CFI = 1.00, RMSEA = .00, 95% CI [.00, .04].
Benight et al., 1999, USA	124 35%, GP, sample with experience of natural disaster (tornado)	18–71	PA & CS & L T1-T2 8–12 months	SE		*Adaptive CO* active *Maladaptive CO* avoidance	Psychological distress	Conservation of resources theory, social-cognitive theory	**Adaptive CO and maladaptive CO did not mediate the effect of SE on MH 8–12 month later (T2).** *Further predictors: Stress, acute psychological distress (T1).* SE was negatively associated with maladaptive CO a^1 = **-.122***, maladaptive CO was not significantly associated with MH b^1 = **.122**, SE was not significantly associated with adaptive CO a^2 = **.11**, adaptive CO was negatively associated with MH problems b^2 = **-.12***. No indirect effects reported.
[R] Chan, 2012, Hong Kong	326 49%, GP, school sample	8–14	R & CS		*Adaptive LOC* internal control for positive events *Maladaptive LOC* internal control for negative events	*Adaptive CO* problem solving, seeking social support, distancing *Maladaptive CO* avoidance (internal. & external.)	Depression	Theory of learned helplessness/attribution theory	**Adaptive CO and maladaptive CO did not mediate the relation of adaptive LOC & maladaptive LOC on MH.** *Further predictors: Gender, age, number of siblings.* ***Dysphoric group***: Adaptive CO 'seeking support' was associated with less MH problem b^1 = **-.39****, adaptive CO 'problem solving' was associated with more MH problems b^2 = **.35****, adaptive CO 'distancing' was not significantly associated with MH b^3 = **-.18**, maladaptive CO 'internalization' was associated with more MH problems b^4 = **.41****, maladaptive CO 'externalization' was not significantly associated with MH b^5 = **-.15**, adaptive LOC was not significantly associated with MH c^1 = **.03**, $c\#^1$ = **-.04**, maladaptive LOC was not significantly associated with MH c^2 = **.03**, $c\#^2$ = **.09**. ***Asymptomatic group:*** Adaptive CO 'seeking support' was associated with less MH problems b^1 = **-.21****, adaptive CO 'problem solving was not significantly

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Table 1 (*continued*)

Author, year, country	Sample size, % male, population (GP, IP, OP)	Mean age (SD)/range	Study design & method	Competence beliefs variable/s	Locus of control variable/s, LOC	Coping variables, CO	Dependent variable/s, mental health, MH	Theoretical background	Key findings
									associated with MH b^2 = **-.10**, adaptive CO 'distancing' was not significantly associated with MH b^3 = **.02,** maladaptive CO 'internalization' was associated with more MH problems b^4 = **.31****, maladaptive CO 'externalization' was not significantly associated with MH b^5 = **.08,** adaptive LOC was not significantly associated with MH c^1 = **-.01**, $c\#^1$ = **-.20,** maladaptive LOC was not significantly associated with MH c^2 = **.06**, $c\#^2$ = **.04**.
Dieserud et al., 2001, Norway	123 40%, IP & OP, psychiatric clinic	IP: 39.6 (16.8)/ 18–75 OP: 40.7 (13.5)/ 18–68	SEM & CS	SE & SEST		*Adaptive CO* problem solving, interpersonal problem solving	Suicide attempts	Cognitive model of depression/ hopelessness, stress-vulnerability model of suicidality	**Adaptive CO mediated the relationship between SE, SEST and MH**. *Further predictors*: *Loneliness, depression, divorce, hopelessness and suicidal ideation.* SEST was associated with more problem solving a^1 = **.29 (sig.)**, SE was associated with more adaptive CO 'problem solving' a^2 = **.66 (sig.)**, adaptive CO 'problem solving' was related to interpersonal problem solving with **.25 (sig.)**, adaptive CO 'interpersonal problem solving' was associated with less suicide attempts (MH): ***b*** = **-.41(sig.)**. Goodness of fit indices: $\chi^2_{(238)}$ = 343.4, RMSEA = .06, CFI = .92.
[R]Fryer et al., 1997, UK	286 0%, GP, school sample	14.7 (0.6)/ 13–15.8	PA & CS	SEST		*Maladaptive CO* emotion oriented	Disturbed eating attitudes	Transactional model of stress, stress reduction model by controllability	**SEST mediated the effect of maladaptive CO on MH**. *Further Predictor: Stress.* Maladaptive CO was associated with lower SEST ***a*** = **.19 (sign.)**, lower SEST was associated with more MH problems ***b*** = **.49 (sign.)**, the indirect effect from maladaptive CO via SEST on MH was significant.
Griva & Anagnostopoulos, 2010, Greece	204 23%, GP, student sample	19.3 (1.5)	PA & CS	SEST		*Adaptive CO* proactive	Anxiety	Transactional model of stress	**Adaptive CO mediated the effect of SEST on MH.** *Further predictor: Optimism.* The more feelings of self-worth increased, the more likely the individual engaged in proactive coping, which in turn resulted in reduced feelings of anxiety. SEST was positively associated with adaptive CO ***a*** *(unstand.)* = **.53****, adaptive CO was negatively associated with MH problems ***b*** *(unstand.)* = **-.23****, SEST was negatively associated with MH problems ***c*** *(unstand.)* = **-.99****, significant indirect effect: ***b*** *(unstand.)* = **-.13**, 95%CI [−.26, −.02].
[R]Halvarsson- Edlund et al., 2008, Sweden	378 0%, GP, school sample	14.4/ 13–15	R & L T1-T2: 1 year	SEST		*Adaptive CO* social support, problem solving *Maladaptive CO*	Unhealthy eating attitudes	Referring to longitudinal studies	**Maladaptive COs (distraction, acting out, take light) might mediate the effect from SEST (T1 & T2) on MH (T3).** *Further predictors: Adaptive CO 'social support' (T1) and maladaptive CO*

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Table 1 (*continued*)

Author, year, country	Sample size, % male, population (GP, IP, OP)	Mean age (SD)/range	Study design & method	Competence beliefs variable/s	Locus of control variable/s, LOC	Coping variables, CO	Dependent variable/s, mental health, MH	Theoretical background	Key findings
			T2-T3: 1 year			Distraction, acting out, take light, avoidance			*'avoidance' (T2 & T3).* SEST (T1) was associated with less MH problems (T3) ***c*** = **-.04***, SEST (T2) was associated with less MH problems (T3) **c** = **-.04***, SEST was not significantly associated with MH when maladaptive COs were included in the model: ***c#*** = ***ns***.
Lopez & Little, 1996, Germany	314 44%, GP, school sample	9.9/ 7.8–11.8	SEM & CS & L T1-T2: 6 weeks	SE	*Adaptive LOC* internal control for positive events	*Adaptive CO* seeking emotional support, socCoop *Maladaptive CO* aggressive, socExpl, hostility, avoidance	Anxiety	Action-theory framework	**Maladaptive COs (hostility and socExpl together) mediated associations between adaptive LOC and MH 6 weeks later.** *Further predictors: T1 adaptive COs (seeking emotional support,* socCoop*), anxiety and T2 adaptive COs (seeking emotional support,* socCoop*).* Adaptive LOC (T1) was associated with less socExpl (T1) ***a*** = **-.11***, socExpl (T1) was associated with less hostility (T2): .31*, hostility (T2) was associated with more MH problems (T2) ***b*** = **.12***.
Martyn-Nemeth et al., 2009, USA	102 21%, GP, school sample	16.8/ 14–18	PA & CS	SEST		*Maladaptive CO* avoidance	Unhealthy eating behaviour & depression	Transactional model of stress	**Maladaptive CO did not mediate between SEST and MH.** *Further predictors: Stress and social support.* The association between maladaptive CO and eating behaviour was not significant when controlling for the effect of SEST on MH. SEST was associated with less maladaptive CO ***a*** = **-.28****, maladaptive CO was associated with more severe eating symptomatology b^1 = **.19***, maladaptive CO was not significantly associated with depressive symptoms b^2 = **-.02**, SEST was associated with less depressive symptoms c^2 = **-.26****.
Muris et al., 2001, Netherlands	373 44%, GP, school sample	15.4 (1.3)/ 13–19	SEM & CS	SE	*Maladaptive LOC* internal control for negative events & external control for positive events	*Maladaptive CO* passive	Depression	Cognitive model of depression/ hopelessness, stress-vulnerability model	**Maladaptive CO and SE mediated between maladaptive LOC and MH.** *Further predictors: Negative parental rearing behaviour.* Maladaptive LOC was associated with lower SE a^1 = **.46 (sig.)**, maladaptive LOC was associated with more maladaptive CO a^2 = **.38 (sign.)**, maladaptive CO was associated with more MH problems b^1 = **.36 (sign.)**, lower SE was associated with more MH problems b^2 = **.20 (sign.)**. Goodness of fit indices: AASR = .03, RMR = .05, NFI = .90, CFI = .91, GFI = .96.
Paterson et al., 2011, Scotland *Inpatient sample*	55 0%, IP, inpatient treatment facility	24 (6.8)	PA & CS	SEST		*Adaptive CO* social problem solving *Maladaptive CO* avoidance, impulsivity	Global eating pathology	Problem-solving model	**SEST (global) mediated the effect of maladaptive CO (avoidance) on MH.** Maladaptive CO was associated with less SEST ***a*** = **-.54*****, SEST was associated with less MH problems ***b*** = **-.54*****,

(*continued on next page*)

Table 1 (*continued*)

Author, year, country	Sample size, % male, population (GP, IP, OP)	Mean age (SD)/range	Study design & method	Competence beliefs variable/s	Locus of control variable/s, LOC	Coping variables, CO	Dependent variable/s, mental health, MH	Theoretical background	Key findings
									maladaptive CO was not significantly associated with MH ***c#* = .04**, the indirect effect from maladaptive CO via SEST on MH was significant.
Paterson et al., 2011, Scotland *General population sample*	50 0%, GP, student sample	26 (7.15)	PA & CS	SEST		*Adaptive CO* social problem solving *Maladaptive CO* avoidance, impulsivity	Global eating pathology	Problem-solving model	**SEST (global) did not mediate the effect of maladaptive CO (avoidance) on MH.**
[R]Pérez et al., 2009, USA	1096 50%, GP, school sample	11–15	SEM & L T1-T2: 6 months T1-T3: 6 months		*Adaptive LOC* internal control for positive events	*Adaptive CO* direct coping (interpers. problems)	Depression	Transactional model of stress, social-cognitive theory	**Adaptive CO (T2) mediated the effect of adaptive LOC (T2) on MH (T3) for girls only.** *Further predictors: Spirituality T1 and depression at T1. Girls*: Adaptive LOC was positively associated with adaptive CO ***a* = .59*****, adaptive CO was negatively associated with MH problems ***b* = -.17*****, the indirect effect from adaptive CO via adaptive LOC on MH was significant: ***β* = .01**. *Boys*: LOC was positively associated with adaptive CO ***a* = .57*****, adaptive CO was not significantly associated with MH ***b* = .05 (*p* = .41)**, the indirect effect from adaptive CO via adaptive LOC on MH was not significant for boys.
Sandler et al., 2000, USA	222 55%, GP, children with divorce	10.1 (1.2)/ 8–12	PA & CS		*Adaptive LOC* internal control for positive events *Maladaptive LOC* fatalistic external control for negative and positive events & internal control for negative events	*Adaptive CO* active *Maladaptive CO* avoidance	Depression, anxiety, conduct disorder *only child reported symptoms*	Transactional model of stress, attribution theory/control theory	**CO did not mediate the relationship between maladaptive LOCs and MH.** Maladaptive LOCs were associated with more adaptive CO ***a*^{1} = .12 and .17***, maladaptive LOCs were associated with more maladaptive CO ***a*^{2} = .07 and .24***, adaptive CO was associated with less MH problems ***b*^{1} = -.17***, maladaptive CO was associated with more MH problems ***b*^{2} = .18***, maladaptive LOC was associated with more MH problems ***c#* = .15*** and **.20****.
Shikai et al., 2007, Japan	146 10%, GP, student sample	20.7 (2.2)	SEM & CS	SE		*Maladaptive CO* emotion oriented *Adaptive CO* task-oriented, avoidance	Depression Anxiety	Transactional model of stress, social-cognitive theory	**Maladaptive CO mediated the association between SE and MH (only anxiety not depression).** SE was negatively associated with maladaptive CO ***a* = -.43*****, maladaptive CO was positively associated with MH problems ***b* = .47*****, SE was associated with lower anxiety: **c# = -.29****, the indirect effect from SE on MH via maladaptive CO was significant ***β* = -.20 (sign.)**. Goodness of fit indices: $\chi^2_{(2)} = .34$, $p = .84$, GFI = .99, CFI = 1.00, RMSEA = .00.
Thorne et al., 2013, Canada	506 49%, GP, school sample	9.31 (0.49) /8-11	SEM & CS	SE		*Adaptive CO* active, distract. *Maladaptive CO* avoidance,	Anxiety	Transactional model of stress, social-cognitive theory	**SE mediated between adaptive CO (active) and MH.** *Further predictors: Adaptive CO (distraction), maladaptive CO (avoidance,*

(*continued on next page*)

Table 1 (*continued*)

Author, year, country	Sample size, % male, population (GP, IP, OP)	Mean age (SD)/range	Study design & method	Competence beliefs variable/s	Locus of control variable/s, LOC	Coping variables, CO	Dependent variable/s, mental health, MH	Theoretical background	Key findings
						social support seeking			*social support seeking).* SE was associated with more adaptive CO ***a*** **= .79****, less adaptive CO was associated with more MH problems ***c#*** **= -.37***, more SE was associated with less MH problems ***b*** **= -.29****, the indirect effect from adaptive CO via SE on MH was significant: ***β*** **= -.22****.
Tomaka et al., 2013, USA	399 53%, GP, student sample	21.53 (4.05)/ 17–39	SEM & CS	SEST		*Maladaptive CO* denial, substance use, behavioural. disengagem. *Adaptive CO* active	Alcohol problem index	Referred to longitudinal studies	**Maladaptive CO mediated between SEST (global & contingent) and MH.** *Further predictors: stress.* Less *global* SEST was associated with more maladaptive CO ***a*** ^{1} **= -.24 (sign.)**, more *contingent* SEST was associated with more maladaptive CO ***a*** ^{2} **= .21 (sign.)**, more maladaptive CO was associated with more MH problems ***b*** **= .57 (sign.)**, the indirect effect from global SEST via maladaptive CO on MH problems controlling for stress was ***β*** **= -.25*****, [95%CI = −0.34, −0.16]. The indirect effect from contingent SEST via maladaptive CO on MH problems: ***β*** **= .12****, 95% CI [0.44, 0.21]. Goodness of fit indices: χ^2 = 144.56(sig.), χ^2/df = 2.04, NFI = .94, RMSEA = .05.
Wegmann & Brand, 2016, Germany	485 26%, GP, community sample	24 (4.96) /14-55	SEM & CS	SE & SEST		*Maladaptive CO* denial, substance use, behavioural disengagem.	Internet communication disorder	I-PACE model (Interaction of Person-Affect-Cognition-Execution)	**Maladaptive CO mediated the effect of SEST and SE on MH.** *Further predictors: Chronic stress, depression, social anxiety, loneliness, social support, internet use-expectancies.* Factor (SEST and SE) was positively associated with maladaptive CO ***a*** **= .50****, maladaptive CO was positively associated with MH problems ***b*** **= .33*****, factor (SEST and SE) was not significantly associated with MH ***c#*** **= .17**, the indirect effect from factor SEST and SE through maladaptive CO to MH was significant: ***β*** **= −.17***.
[R]Brand et al., 2014, Germany *same study sample as* Wegmann & Brand 2016	1019 38%, GP, community sample	25.61 (7.37)/ 14–55	SEM & CS	SE & SEST		*Maladaptive CO* denial substance use, behavioural disengage.	Internet addiction	Model on Generalised Internet Addiction	**Maladaptive CO mediated the associations between SEST, SE and MH.** *Further predictors: Stress, depression, social anxiety, loneliness, social support.* Factor (SEST and SE) was negatively associated with maladaptive CO ***a*** **= -.22***, maladaptive CO was positively associated with MH problems ***b*** **= .36*****, factor (SEST and SE) was not significantly associated with MH ***c#*** **= -.04**, the indirect effect from factor SEST and SE through maladaptive CO to MH was significant: ***β*** **= −.08***.
Weigold & Robitschek, 2011, USA			SEM &	SE		*Adaptive CO* problem focused	Anxiety		**Adaptive CO mediated the association between SE and MH over time**. *Further*

(*continued on next page*)

Table 1 (*continued*)

Author, year, country	Sample size, % male, population (GP, IP, OP)	Mean age (SD)/range	Study design & method	Competence beliefs variable/s	Locus of control variable/s, LOC	Coping variables, CO	Dependent variable/s, mental health, MH	Theoretical background	Key findings
	478 36%, GP, student sample	20.64 (1.67) /18-25	CS & L T1-T2: 7 days T2-T3: 7 days			*Maladaptive CO* emotion oriented, avoidance		Transactional model of stress, social-cognitive theory	*predictors: Hardiness, personal growth initiative.* *Women*: SE was associated with more adaptive CO ***a* = .21 (sign.)**, adaptive CO was associated with less MH problems *b* = −.15 (sign.), significant indirect effect. *Men*: SE was associated with more adaptive CO ***a* = .21 (sign.)**, adaptive CO was associated with less MH problems ***b* = -.14 (sign.)**, significant indirect effect. Goodness of fit indices: χ^2/df = 926.06 / 497) = 1.86, IFI = .91, CFI = .909, RMSEA = .06, 90% CI [.05, .07].

Note. CI = confidence interval, CS = cross-sectional, GP = general population, IP = inpatients, L = longitudinal, OP = outpatient, PA = path analysis, R = regression analysis, SE = self-efficacy, SEM = structural equation modelling, SEST = self-esteem, SocCoop = social cooperation, SocExpl = social exploitation.
[R] = study not included in the meta-analysis; *a* = standardised coefficient (*β*) of the relationship between the independent variable (CO, LOC, COMB) and the mediator variable (CO, LOC, COMB); *b* = standardised coefficient (*β*) of the relationship between the mediator variable and the dependent variable (MH) controlling for the independent variable; *c* = standardised coefficient (*β*) of the relationship between the independent variable and the dependent variable; *c#* = standardised coefficient (*β*) of the relationship between the independent variable and the dependent variable controlling for the mediator variable. *$p < .05$; **$p < .01$; ***$p < .001$; ****$p < .0001$.

3.2. Selection and characteristics of the studies included in the meta-analysis

Owing to the limited number of longitudinal studies and to improve homogeneity of main study characteristics, we decided to include only cross-sectional data in our meta-analysis. As two longitudinal studies did not provide cross-sectional data, they were excluded (Halvarsson-Edlund et al., 2008; Pérez et al., 2009). Furthermore, five (26%) of the 19 identified studies did not report necessary correlation coefficients (Chan, 2012; Fryer et al., 1997; Lopez & Little, 1996; Martyn-Nemeth, Penckofer, Gulanick, Velsor-Friedrich, Bryant, et al., 2009; Weigold & Robitschek, 2011). We thus contacted authors of these five studies; three of them provided the necessary information (Lopez & Little, 1996; Martyn-Nemeth, Penckofer, Gulanick, Velsor-Friedrich, Bryant, et al., 2009; Weigold & Robitschek, 2011) and were included in the meta-analysis. Two studies were excluded due to missing correlation matrices (Chan, 2012; Fryer et al., 1997). Two studies (Brand et al., 2014; Wegmann & Brand, 2016) reported data from the same sample; we included only the latest published study to avoid a sample overlap (Wegmann & Brand, 2016). One study reported data of two independent samples (Paterson et al., 2011). Consequently, both samples were included separately in the meta-analysis. Thus, the final database for this meta-analysis consisted of 15 independent studies from 14 full-text articles.

Table 1 presents the most important study characteristics. The included studies were mainly carried out in Western societies: the US (six studies); Germany and Scotland (two studies each); and Canada, Greece, the Netherlands, and Norway (one study each). One was carried out in Japan. Sample sizes ranged from 50 to 506 for a total of 3986 participants with a mean age of 21.2 years (*SD* = 1.62; range = 8–75). Across studies, samples comprised slightly more females (*m* = 35% male participants, *n* = 1395, range = 0–60%). Thirteen studies (87%) examined non-clinical samples. One study (7%) included a mixed sample of inpatients and outpatients (Dieserud et al., 2001), and another study (7%) included an inpatient sample (Paterson et al., 2011).

Most studies showed reasonable quality of reporting (mean = 18 out of 22 points). Thus, we decided to include all studies for further statistical analyses.

3.3. Measurement of competence beliefs, locus of control, coping, and mental health

With regard to the applied coping measurements, most studies (*k* = 9, 60%) investigated both adaptive and maladaptive coping, four studies (27%) examined only maladaptive coping, and two studies (13%) only adaptive coping. Three studies (20%) assessed more than one mental disorder. Anxiety (*k* = 5; 33%), depression (*k* = 3; 20%), problems related to alcohol (*k* = 2; 13%), and unhealthy eating behaviour (*k* = 3; 20%) were the most frequently assessed mental health problems. One study (7%) each assessed suicide attempts, psychological distress, and Internet communication disorder. Furthermore, one study (7%) used an aggregated score for symptomatology as an outcome including depression, anxiety, and conduct disorders (Sandler et al., 2000). Overall, 14 studies (93%) investigated coping and mental health together with competence beliefs. One study (7%) investigated coping and mental health with either maladaptive or adaptive locus of control; two studies (13%) included both locus of control and competence beliefs. Assessment scales used in the included studies varied widely; a total of 10 different assessment instruments for adaptive and 9 for maladaptive coping, 2 for adaptive and 2 for maladaptive locus of control, 10 for competence beliefs, and 18 measurements for various mental health problems were used (see Appendix C). All studies used self-report data; one study additionally examined parent-report data (Sandler et al., 2000). To improve the homogeneity of our outcome measures, we only included self-report data for the meta-analysis.

Table 2
Pooled correlation matrix based on the fixed-effects models of stage 1 analysis.

Variable	1	2	3	4	5	6
1. Adaptive coping	–					
2. Maladaptive coping	.27***	–				
3. Competence belief	.27***	-.09***	–			
4. Maladaptive locus of control	-.10**	.21***	-.47***	–		
5. Adaptive locus of control	.42***	-.06	.49***	-.10	–	
6. Mental health	-.08***	.29***	-.27***	.35***	-.21***	–

Note. $n = 15$ studies. The elements are based on omitted correlations approach and the two-staged structural equation modelling.
Significant codes: '***' = $p < .001$ '**' = $p < .01$ '*' = $p < .05$.

3.4. First stage of TSSEM of the hypothesized mediation model

Table 2 presents detailed results of the first stage. We pooled the 225 correlation coefficients into one synthesized matrix relevant for the second-stage analysis.

3.5. Second stage of TSSEM of the hypothesized mediation model

In the second stage, we estimated a saturated model in which all variables are associated with each other, that is, a model with zero degrees of freedom (see Table 3). Consequently, model fit could not be assessed.

To assess model fit by gaining one degree of freedom, the smallest insignificant path coefficient was eliminated (i.e., the path running between adaptive coping and maladaptive locus of control, $\beta = 0.03$, $p = .53$) (see Fig. 3). The resulting final model (mediation model 1) had an excellent model fit ($\chi^2_{[1]} = 0.41$, $p = .52$, RMSEA = 0.00, CFI = 1.00, TLI = 1.01). Adaptive coping was positively associated with competence beliefs ($\beta = 0.09, p < .01$) and with adaptive locus of control ($\beta = 0.37, p < .001$). More maladaptive coping had a positive association with maladaptive locus of control ($\beta = 0.23, p < .001$) but showed no significant associations with competence beliefs and adaptive locus of control. Mental health problems were significantly associated with more maladaptive coping ($\beta = 0.23, p < .001$), more maladaptive locus of control ($\beta = 0.25, p < .001$), and less adaptive locus of control ($\beta = -0.13, p < .05$). However, mental health and adaptive coping were not significantly associated with each other. The association between competence beliefs and adaptive locus of control ($\beta = 0.48, p < .001$) was positive, and the association with maladaptive locus of control was negative ($\beta = -0.47, p < .001$). Adaptive coping was significantly positively associated with maladaptive coping ($\beta = 0.30, p < .001$). Sensitivity analysis revealed stable results when the two studies on clinical samples were excluded from the analysis.

3.6. Estimation of indirect effects of the hypothesized mediation model

Fig. 4 presents the results of the estimated indirect effects. Only one indirect effect from maladaptive locus of control via maladaptive coping to mental health problems ($\beta = 0.05$, standardised 95% CI [0.03, 0.07]) was significant. Furthermore, there was a significant direct association between maladaptive locus of control on mental health problems ($\beta = 0.25, p < .001$).

3.7. Alternative mediation model

The alternative final model (mediation model 2), which tested locus of control and competence belief as mediators, did not have an adequate model fit ($\chi^2_{[1]} = 325$, $p < .01$, RMSEA = 0.29, CFI = 0.88, TLI = −0.79).

4. Discussion

Our results extend and help to resolve the current conflicting literature on the interplay of competence and locus of control with coping in mental health promotion by applying meta-analytic SEM. In our systematic review, most of the 19 reviewed studies identified coping as the mediator between competence beliefs/locus of control and mental health defined as the presence of current symptoms and/or mental disorder(s), yet there was also evidence to the opposite placing competence beliefs/locus of control as the mediator. Using TSSEM to quantitatively investigate the relative strength of associations among all variables simultaneously within one model, we found that maladaptive coping (e.g., rumination) mediates the relationship between high levels of maladaptive locus of control (i.e., external locus of control beliefs in case of positive events) and poor mental health (e.g., depression or anxiety). In contrast, adaptive coping (e.g., problem solving) did not mediate this relationship as it was only significantly associated with competence-beliefs (i.e., self-efficacy and self-esteem) and adaptive locus of control (i.e., internal locus of control in case of positive events) but, unexpectedly, not with mental health. Both maladaptive and adaptive locus of control but not competence beliefs were directly associated with mental health independent from coping. While maladaptive but not adaptive locus of control was directly associated with maladaptive coping, adaptive but not maladaptive locus of control was directly associated with adaptive coping. The alternative model, which tested locus of control and competence beliefs as parallel mediators of

Table 3
Standardised parameter estimates based on the fixed-effects models of stage 2 analysis.

Path	Standardised estimate	Standard error	Standardised 95% CIs	*p*-value
Adaptive coping → Competence belief	.07	.05	-.03; .17	.16
Adaptive coping → Maladaptive locus of control	.03	.05	-.13; .07	.53
Adaptive coping → Adaptive locus of control	.38	.05	.29; .47	< .001
Maladaptive coping → Competence belief	.04	.05	-.06; .13	.46
Maladaptive coping → Maladaptive locus of control	.22	.05	.13; .31	< .001
Maladaptive coping → Adaptive locus of control	-.05	.05	-.16; .05	.33
Mental health → Adaptive coping	-.04	.03	-.10; .01	.12
Mental health → Maladaptive coping	.23	.03	.18; .28	< .001
Mental health → Competence belief	-.06	.05	-.16; .05	.31
Mental health → Maladaptive locus of control	.25	.08	.10; .41	< .01
Mental health → Adaptive locus of control	-.13	.06	-.24; −.02	< .05
Competence belief → Adaptive locus of control	.49	.04	.41; .57	< .001
Maladaptive locus of control → Competence belief	-.47	.04	-.55; −.39	< .001
Maladaptive locus of control → Adaptive locus of control	-.10	.06	-.22; .02	.10
Adaptive coping → Maladaptive coping	.30	.02	.26; .35	< .001

Note. $n = 15$ studies. The elements are based on omitted correlations approach and the two-staged structural equation modelling. Goodness of fit indices: $2_{(0)} = 0.00$, $p = .00$, RMSEA = 0.00, CFI = 1.00, CI = confidence interval.

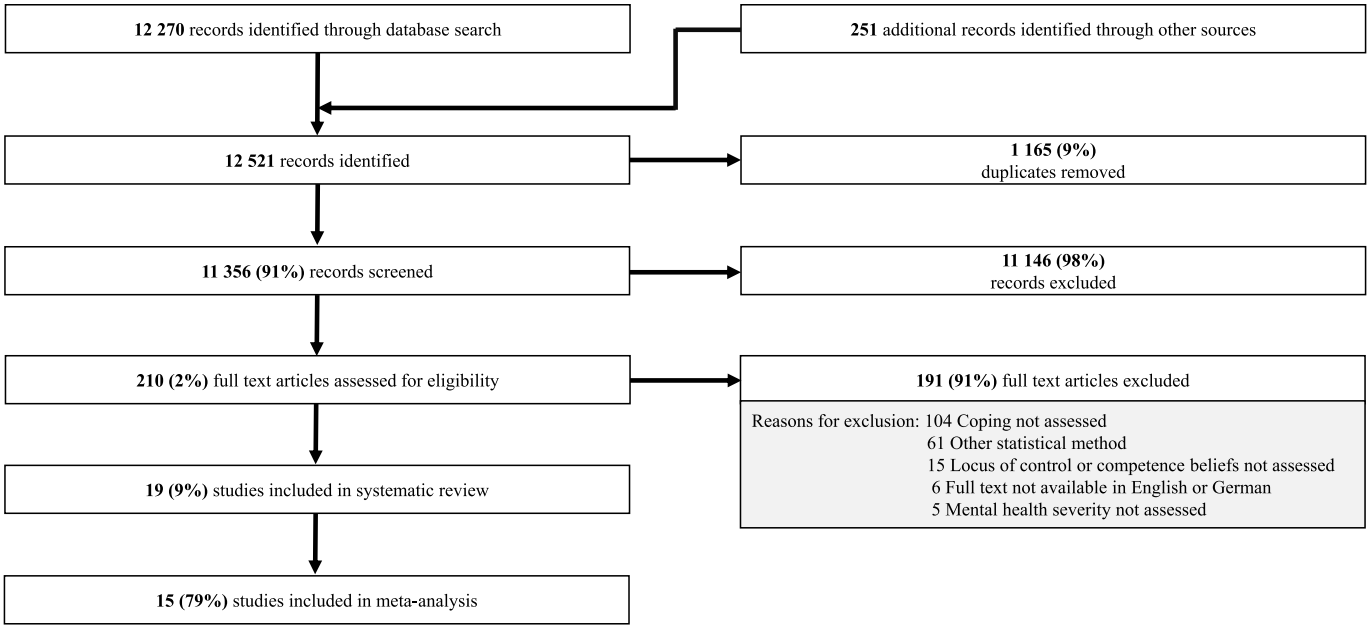

Fig. 2. PRISMA flow chart.

the relationship between coping and mental health, did not show adequate model fit. This further supports the hypothesized mediating role of maladaptive coping.

4.1. Mediation effect through maladaptive coping

Interestingly, only one significant indirect effect emerged in our model, indicating that the relationship between maladaptive locus of control and poor mental health was mediated by maladaptive coping. This is in line with theoretical considerations and empirical results (Abramson, Seligman, & Teasdale, 1978; Lefcourt, 1976; Yeoh et al., 2017) that individuals who report a maladaptive locus of control (i.e., excessive external and a lack of internal locus of control) tend to underestimate the potential positive consequences of their behaviour and the likelihood to be rewarded for this behaviour. This anticipated absence of positive consequences might then lead to learned helplessness, which prompts individuals to use maladaptive coping strategies, such as self-pity, and thereby jeopardises their mental health (Lazarus & Folkman, 1984; Rotter, 1966).

4.2. Lack of mediation effect through adaptive coping

Unexpectedly, despite significant associations with both adaptive locus of control and competence beliefs, adaptive coping was not associated with mental health. Thus, adaptive coping did not mediate the effects between competence beliefs and locus of control on mental health. The positive association between adaptive locus of control, competence beliefs, and adaptive coping, however, is in line with previous studies reporting that individuals perceiving high controllability of events also tend to evaluate themselves positively (i.e., high self-esteem) and expect to perform successfully (i.e., high self-efficacy). Thus, they perceive difficult tasks as challenges that can be mastered and prefer adaptive coping strategies over maladaptive ones (Dumont & Provost, 1999; Lane, Jones, & Stevens, 2002; Schmidt, Grunert, Schimmelmann, Schultze-Lutter, & Michel, 2014). The lack of an association between adaptive coping and mental health in our model was rather unexpected as studies suggested adaptive coping to be crucial for reducing the probability of poor mental health with regard to suicidality (Schmidt et al., 2017). Furthermore, adaptive coping was found to be important for resilience and mental health (Aldao et al., 2010; Bandura, 1993; Barlow, 2000, 2002; Schultze-Lutter, Schimmelmann, & Schmidt, 2016; Sowislo & Orth, 2013). Notably, our dependent variable

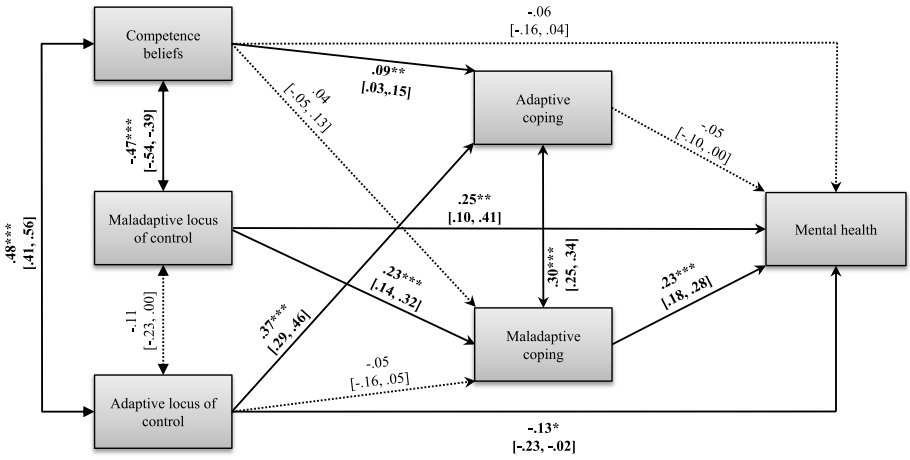

Fig. 3. Results of the two-staged structural equation modelling analyses: coping as mediator between competence beliefs, locus of control and mental health.
Note. Model fit indices: $\chi 2(1) = 0.41$, $p = .52$, CFI = 1.00, RMSEA = 0.00. Values are standardised path coefficients including 95% confidence intervals in brackets. Significant codes: '***' = $p < .001$ '**' = $p < .01$ '*' = $p < .05$. Solid arrows indicate significant coefficients. Dotted arrows indicate non-significant coefficients.

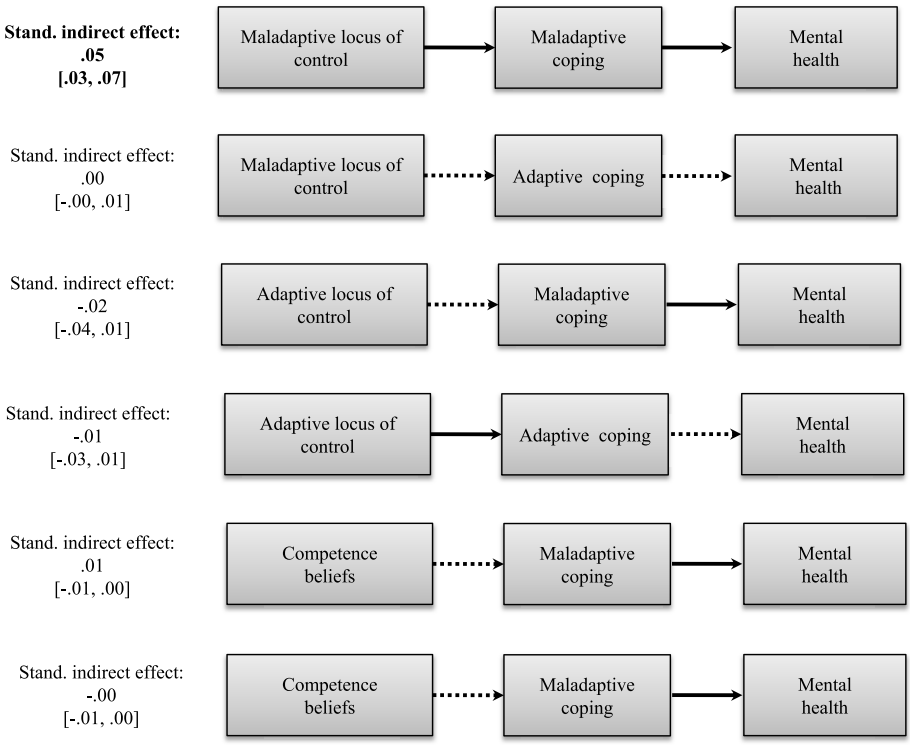

Fig. 4. Results of estimation of indirect effects: coping as mediator between locus of control, competence beliefs and mental health outcomes.
Note. Values are standardised path coefficients including 95% confidence intervals in brackets. Solid arrows indicate significant coefficients. Dotted arrow indicate direct non-significant coefficients.

"mental health" focused on negative aspects of mental health (i.e., presence of mental disorder[s], current symptom levels) rather than on positive aspects, such as QoL. Therefore, our finding corresponds well to theoretical and empirical results suggesting that adaptive coping strategies may generally be related to long-term positive mental health outcomes and good QoL while maladaptive coping strategies may mainly relate to negative aspects in terms of mental disorder (Kirby, Shakespeare-Finch, & Palk, 2011; Manne et al., 2015; Trevino et al., 2010; Zuckerman & Gagne, 2003). Following this line of argument, this may also explain why maladaptive locus of control was associated with more severe mental health problems. However, this is contradicted by the fact that adaptive locus of control was also significantly associated with better mental health in our study.

Alternatively, an excessive use of maladaptive coping strategies may have a more detrimental impact on mental health than a lack of positive coping strategies. In line with this, in our meta-analysis, only maladaptive coping had a significant association with better mental health when the impact of both types of coping was compared directly within one model. Such a result pattern was also identified in previous studies using separate models for adaptive and maladaptive coping to predict mental health and well-being (Bradley, Schwartz, & Kaslow, 2005; Hebert, Zdaniuk, Schulz, & Scheier, 2009; Thomasson & Psouni, 2010).

Furthermore, given the cross-sectional nature of our meta-analysis, it seems possible that locus of control also mediates the influence of competence beliefs on mental health. This would indicate that the availability of adaptive locus of control leads to increased levels of competence beliefs and adaptive coping, which positively effects mental health. However, our alternative model supports the mediating role of coping.

4.3. Direct relationship of locus of control with coping

Furthermore, we found that adaptive locus of control had a significant direct association with adaptive coping while maladaptive locus of control was associated with maladaptive coping. On the contrary, adaptive locus of control was not associated with maladaptive coping, and maladaptive locus of control was not associated with adaptive coping. This suggests that there may be domain-specific, differential associations between adaptive and maladaptive locus of control and coping. Therefore, interventions aiming at improving maladaptive coping will be most effective by diminishing maladaptive locus of control while interventions aiming at boosting adaptive coping should target adaptive locus of control.

4.4. Direct relationship of locus of control on mental health

In addition, we found that maladaptive and adaptive locus of control but not competence beliefs had significant direct associations with mental health. This indicates that the absence of adaptive locus of control (i.e., of internal locus of control in case of negative events) or presence of maladaptive locus of control (i.e., of external locus of control in case of positive events) might be more relevant for mental health than a lack of competence beliefs in terms of low self-efficacy and low self-esteem. Notably, this also suggests that locus of control has an impact on mental health independent from coping. This fits with previous studies demonstrating that perceived high controllability of events (i.e., an internal locus of control) buffers stress on a cognitive level independent from actual behaviour and thereby improves mental health independent from coping (behaviour) (Johnson, Panagioti, Bass, Ramsey, & Harrison, 2017; Lopez & Little, 1996; Schmidt et al., 2014; Weisz, Weiss, Wasserman, & Rintoul, 1987). Thus, this indicates that having the expectation of being in control may be even more important for mental health than actually achieving this expectation in everyday life (Schwarzer, 2004). However, this does not explain why competence beliefs, which also operate on a cognitive level, had no direct link to mental health in our model. Given that competence beliefs had the strongest associations with adaptive and maladaptive locus of control in the model, these constructs seem to overlap and mutually influence each other (Krampen, 1991), and competence beliefs by themselves might not explain a sufficiently large variance. Thus, the association between competence beliefs and mental health remained insignificant. For example, while competence beliefs in terms of self-efficacy generally refer to specific beliefs about the anticipated ability to perform each step towards reaching a specific goal (e.g., "I am certain that I can

ski down this hill."), adaptive locus of control represent a more general belief (e.g., "It is in my control to do what I want to do.") (Bandura & Cervone, 1983; Bandura & Schunk, 1981).

Hence, due the shared variance between both constructs (or due to a common latent factor), they may not have a differential impact on mental health but, rather, act synergistically. This is also shown by the result that adaptive locus of control is significantly associated with competence beliefs but not with maladaptive locus of control. More conceptual research on the commonalities and differences of these concepts is needed.

4.5. Strengths and limitations

To the best of our knowledge, no previous study has combined meta-analysis and SEM to synthesize the direct and indirect effects of competence beliefs, locus of control, and coping on mental health. However, some limitations must be considered. First, the classification of coping strategies as adaptive and maladaptive might be critical as, depending on intensity and context, nearly every coping strategy can be either maladaptive or adaptive (Schmidt et al., 2014). However, we decided on a dichotomous classification (i.e., adaptive vs. maladaptive) given the heterogeneity of coping measurements used in the studies included in this meta-analysis. This decision was based on theoretical and empirical models that identified specific coping strategies as adaptive or maladaptive over several conditions (Janke et al., 1997). Second, we applied fixed effects models in the meta-analytic SEM. Consequently, between-study heterogeneity is not accounted for at stage 1 and 2 of the analysis, which may result in biased estimates of model parameters as well as standard errors and allows only conditional inference, i.e. the results are only relevant to the studies included in this meta-analysis. This may limit the generalisability of our results. However, fixed effects models are recommended if the number of studies included is small, because the likelihood of non-convergence increases with small numbers of studies as in our meta-analysis (Jak & Cheung, 2018a,b; Schmidt et al., 2009). Third, we did not test for the influence of age and gender on coping strategies as additional predictors in our analysis due the limited number of studies included, which would have led to problems with statistical power. However, previous studies showed that the extent to which individuals benefit from coping strategies may vary, for example, between men and women (Byrne, 2000). Thus, as women are slightly overrepresented in our study, this may lead to a bias, and our results may not represent specific interactions for men. Therefore, future studies should include gender and age as predictors in their analyses or analyse data separately for men and women. Fourth, owing to the limited number of studies included in the meta-analysis, we did not further consider quality of reporting of the studies or address a potential publication bias. However, the average quality of reporting of the studies was reasonable. In addition, we included significant and non-significant results in our meta-analysis, which may limit the possibility of any publication bias. Fifth, we could include only cross-sectional studies in the meta-analysis due to the limited number of longitudinal studies providing sufficient statistical information. Therefore, the associations between model variables cannot be interpreted as causal relationships. In particular, we could not disentangle cause and effect among competence beliefs, locus of control, and coping. This highlights the need for more longitudinal studies with several assessment-waves to assure the postulated temporal sequence of the model variables. However, the results of our meta-analytic SEM model are supported by the fact that four out of five longitudinal studies included in the systematic review also found that coping mediates the relationship between competence beliefs/locus of control and mental health. Sixth, we combined clinical samples and general population samples, which may mask differential effects between model variables. However, an additional sensitivity analysis excluding the two studies on clinical samples did not change the results substantially, which points to the relevance of these factors across different stages of mental disorders. Seventh, we combined symptoms of various mental disorders in one mental health variable in the meta-analytic SEM. While this heterogeneity of mental health outcomes may mask differential effects for specific mental disorders (Shikai et al., 2007), it reflects the high levels of comorbidity generally found in clinical samples and in particular in subclinical stages (Caspi & Moffitt, 2018; McGorry, Hartmann, Spooner, & Nelson, 2018). Moreover, our decision was based on recent evidence showing that competence beliefs, locus of control, and coping are relevant factors for the development and maintenance of a broad range of mental disorders (Bettis et al., 2016; Ehrenreich-May & Chu, 2014; Fairburn, Cooper, & Shafran, 2003; Mansell, 2005).

4.6. Conclusion and implications for interventions

Despite these limitations, if replicated, the results of our study may have important clinical implications for current psychological interventions successfully targeting competence beliefs, locus of control, and/or coping in samples with subclinical symptoms and/or mental disorders (Das, Salam, Arshad, Finkelstein, & Bhutta, 2016; Kendall et al., 2016, 2017). Regarding mental health promotion, our study suggests that integrative interventions should focus on reducing both maladaptive locus of control and maladaptive coping strategies as early as possible to disrupt any potential detrimental cascading effect on mental health. This is in line with findings of intervention studies showing that coping efficacy seems to be an important mechanism of change to improve mental health outcomes (Kendall et al., 2016). According to our results, maladaptive locus of control should be targeted before coping as this will lead to reduced maladaptive coping and thereby promote mental health (Tarrier & Johnson, 2016). This could be done via established cognitive-behavioural interventions with special focus on developing skills and techniques to correct dysfunctional cognitions (i.e., maladaptive locus of control) followed by stress-management training (Das et al., 2016; Kendall et al., 2016, 2017). Additionally, reattribution training may enhance an adaptive locus of control as a protective factor and thereby promote mental health directly. Despite the lack of a mediation effect through adaptive coping, we would still recommend enhancing adaptive coping (Kenny, Dooley, & Fitzgerald, 2015) as it has been demonstrated to be relevant for positive mental health, such as resilience (Johnson et al., 2017).

In summary, our results provide evidence for the importance of locus of control, competence beliefs, and coping for mental health, and contribute to a better understanding of their complex interrelations. Therefore, these variables and, in particular, maladaptive coping as the mediator should be targeted in an integrative way and as early as possible to support mental health.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.brat.2019.103442.

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