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Interpersonal psychological factors and asthma outcomes in romantic relationships: a systematic review

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ABSTRACT

Objective: In adults with asthma, intrapersonal psychological factors are important in asthma outcomes; however, the role of interpersonal factors, particularly within romantic relationships, remains unclear. This study aimed to systematically review the research involving couples and focusing on the associations of asthma outcomes with interpersonal factors (particularly partners' responses to asthma and dyadic factors).

Methods: A systematic literature search was conducted across databases of PsycINFO, CINAHL, MEDLINE, EMBASE, and Web of Science. Manual searching was also conducted by screening the reference lists and citations. All results were narratively synthesised.

Results: Seven studies ($N = 680$ dyads) were included in the review. The evidence suggests that: (1) Better patient outcomes (better physical health and asthma quality of life and lower healthcare use) were associated with partners' lower psychological distress and partners' perceptions of better patient asthma self-management; (2) Asthma symptom severity was positively associated with dyadic factors (better marital functioning and higher relationship satisfaction).

Conclusions: This review highlighted that interpersonal factors are important for asthma outcomes in adults with asthma, noting that these factors remain understudied. Future research is needed to adopt a dyadic approach and investigate other interpersonal factors, such as partners' cognitive appraisals of the illness and behavioural responses.

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KEYWORDS
asthma outcomes; adult; partner; interpersonal factors; dyadic factors

Introduction

Asthma is one of the most prevalent chronic respiratory diseases, affecting over 300 million people worldwide (Global Initiative for Asthma, 2024). It is characterised by

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variable symptoms, including shortness of breath, chest tightness, coughing and wheezing, and variable expiratory airflow limitation, which are usually triggered by a range of factors such as an allergen or irritant exposure, change in weather, exercise, or viral respiratory infections (Global Initiative for Asthma, 2024). Achieving optimal asthma control, including good symptom control and low future risk of adverse asthma outcomes, especially exacerbations, is crucial in asthma management. Despite the availability of effective treatments, suboptimal asthma control is common in a proportion of patients. For example, two European-wide surveys, each involving approximately 8000 participants living with asthma, showed that 45 to 56% of patients reported suboptimal asthma control (Braido et al., 2016; Price et al., 2014). Uncontrolled symptoms were found to be associated with psychological distress (Racine et al., 2021), which may further link to poor asthma outcomes such as increased rescue medication use, impaired asthma-related quality of life (QoL), and higher hospitalisation rates due to asthma (Thomas et al., 2011). Poor sleep quality (Luyster et al., 2016), absenteeism from work/education, and low productivity (Hsu et al., 2016; Pavord et al., 2017) are also frequently reported by patients with uncontrolled asthma compared with those with well-controlled asthma. These studies have shown that suboptimal asthma control has multifaceted negative influences on patients.

Psychological factors have been identified to significantly impact asthma control and other asthma-related outcomes (Thomas et al., 2011). An earlier review put forward an "ABC" (i.e. the affect, behaviour, and cognition) framework to understand how the three domains of psychological factors and their interplay influence asthma-related outcomes (Yii & Koh, 2013). Overall, affective distress (e.g. anxiety and depression symptoms), maladaptive behaviours (e.g. dysfunctional breathing behaviours and nonadherence to medications), and dysfunctional cognitions (e.g. impaired cognitive functions and negative beliefs about the illness) may independently contribute to worsened asthma outcomes, including poor lung function and asthma control, lower asthma QoL, and more healthcare usage (Yii & Koh, 2013). Furthermore, these three domains are closely interlinked, leading to impaired asthma outcomes. For example, psychological distress has been shown to be closely related to negative beliefs about medication (e.g. concern about potential side effects of inhaled corticosteroids and the belief that medication adherence is not necessary), which was further associated with poor medication adherence in the asthma population (Dong et al., 2024; Sofianou et al., 2013). Additionally, poor mental health status was found to be related to unhealthy behaviours such as smoking and physical inactivity, even after controlling for sociodemographic characteristics (Bush et al., 2007; Strine et al., 2004). Although the "ABC" framework provides an overview of the relationships between psychological factors and asthma outcomes, it exclusively focuses on intrapersonal factors and does not consider how people living with asthma are affected by interpersonal variables and the psychosocial environment surrounding them.

Psychosocial factors are also important in asthma morbidity (Chen & Schreier, 2008). In pediatric asthma, two reviews have shown that multiple family-level factors (e.g. parent psychological dysfunction, parent-child relationship, and negative family emotional climate) are related to pediatric asthma onset and outcomes (Kaugars et al., 2004; Wood et al., 2015). However, in the adult asthma population, relatively less research has investigated the roles of proximal psychosocial factors. Although adult

asthma patients take more responsibility for their asthma management compared to children or adolescents with asthma who tend to rely on caregivers to manage their asthma, adult patients' asthma outcomes may also be influenced by proximal psychosocial factors or interpersonal factors within close relationships.

For adult patients with romantic partners, their asthma outcomes may be associated with interpersonal factors within the relationship (Weitkamp et al., 2021), such as intimate partners' responses to the illness (e.g. emotional, cognitive, and behavioural responses) and dyadic factors (e.g. relationship satisfaction). Partners of adult asthma patients, especially those who take primary responsibility for daily caring for people with severe asthma, may experience emotional distress and impaired QoL resulting from substantial caring burdens (Majellano et al., 2021; 2022). Psychological distress reported by partners has been associated with asthma patients' poor physical functioning and more physician services utilisation (Afari & Schmaling, 2000). Partner cognitive responses, particularly partner beliefs regarding patients' ability to manage illness, may also be important for patient outcomes. Patient asthma-related QoL was positively associated with their partners' perception of patient asthma self-efficacy (Geden et al., 2002). Evidence from other chronic health conditions, such as knee osteoarthritis, also showed that partners' confidence in patient self-efficacy of illness management predicted the improvements of patients' psychological and physical health over time up to 12 months, even after controlling for patients' evaluations of their own self-efficacy (Gere et al., 2014). Partner behavioural responses such as provisions of practical support that match patients' needs (e.g. accompanying patients to hospital visits and engaging with physician-patient communication, taking over daily household tasks and childcare, gathering illness-related information) may help to reduce patients' burdens and improve patient outcomes such as increasing their QoL (Bodschwinna et al., 2022; Lau et al., 2024; Weitkamp et al., 2021). Additionally, dyadic factors, which refer to dynamics and interaction within couples as well as their evaluation of the romantic relationship, also have health implications (Shrout et al., 2024). For example, research found that relationship satisfaction was positively related to health-related QoL in patients with Parkinson's disease (Heine et al., 2021). These findings, although limited, have suggested that in adults living with asthma who have a romantic partner, interpersonal factors, particularly partners' responses to asthma (including emotional, cognitive, and behavioural responses to the illness) and dyadic factors, may significantly impact asthma-related outcomes. These interpersonal factors, together with intrapersonal psychological factors proposed in the "ABC" framework (Yii & Koh, 2013), may help to further understand the role of psychosocial factors in adult patients' asthma outcomes and inform potential targeted couple-based psychological interventions.

To date, no systematic review has comprehensively summarised the associations of asthma outcomes with interpersonal factors in adults with asthma. Prior research that has investigated the effect of interpersonal factors (e.g. spousal support) focused on patients' perspectives only (De Ridder et al., 2005; Foster et al., 2017; Lind et al., 2015). Given the interdependence and mutual influence within couples, exploring the interpersonal factors from the perspectives of both asthma patients and partners may give further insight into the associations of patients' asthma outcomes with partner factors and relationship dynamics. Therefore, this study aimed to identify and synthesise empirical studies focusing on couples with one member diagnosed with

asthma. Expanding the "ABC" framework to include interpersonal factors was not the aim of the current study. Instead, this study aimed to apply this framework in the context of romantic relationships and provide a narrative synthesis about the relationships between interpersonal factors, including partners' responses to asthma and dyadic factors, and asthma-related outcomes.

Methods

This systematic review was conducted and reported by following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Page et al., 2021) and registered in PROSPERO (Registration Number: CRD42023491356).

Search strategy

The literature search process was conducted in December 2023. PICO (population, phenomenon of interest, and context) framework was applied to form the following keywords: "adult asthma patients", "partners", and "asthma outcomes". All synonyms and search strategies used are shown in Appendix 1. Databases used for searching relevant studies published from January 1970 to December 2023 include *PsycINFO*, *CINAHL*, *MEDLINE*, *EMBASE*, and Web of Science. Manual searching was also conducted by screening the reference lists and citations of included studies and identifying relevant articles in *Connected Paper*. Grey literature was not searched due to the lack of peer review.

Study selection

Inclusion criteria were as follows: (a) sample consisting of couples with one member diagnosed with asthma, and both members were aged 18 years or older, (b) focus on the associations of patients' asthma-related outcomes with intimate partners' variables or dyadic variables, and (c) articles written in English or Chinese. Exclusion criteria were (a) review or study protocol or conference abstract, (b) samples involving participants with mixed chronic diseases including asthma and data for asthma patients and their partners cannot be separated out, (c) unavailable full text, and (d) articles not written in English or Chinese. There were no restrictions on the study design to ensure relevant evidence was considered (e.g. quantitative, qualitative, and intervention studies were all considered). After removing duplicate articles, two reviewers independently screened the titles and abstracts based on the abovementioned criteria. After the initial screening for titles and abstracts, full texts of potential articles were independently checked for eligibility by the two reviewers. Any disagreements were solved through discussion between the two reviewers. If a consensus was not reached, a third reviewer was consulted.

Study quality assessment

To reduce bias and improve the quality of assessment, a two-reviewer system used a quality assessment tool for observational cohort and cross-sectional studies

developed by the National Institutes of Health/National Heart, Lung and Blood Institute (2021). This assessment tool was used as all included studies were quantitative. This tool includes 14 questions, with each question rated using one of three options (i.e. "Yes", "No", and "Cannot determine"/"Not applicable"/"Not reported"). To clarify, "exposure" in some questions in this assessment tool refers to the independent variables (i.e. partners' responses to asthma and dyadic factors) examined in the current review. Two reviewers involved in the study selection process independently rated on 14 questions of this assessment tool and provided an overall evaluation of the quality of each included study (i.e. "Good", "Fair", or "Poor"). Any disagreements were resolved through discussion between the two reviewers, and a third reviewer was sought if consensus was not reached.

Data extraction and synthesis

The data extraction sheet includes details about the first author, year of publication, study country, study design, participants' demographic characteristics (i.e. sample size, gender, mean age, ethnicity, education background, household yearly income, and marital status) and patients' asthma severity, partner-reported variables, asthma-related outcomes, key results relevant to the review questions, and extra findings of included studies. Two reviewers involved in the screening process completed the data extraction, with one reviewer initially completing all data extraction. To reduce bias, the same two reviewers independently completed double data extraction for two studies (29% of the total). There was agreement on 92% of the extraction. Disagreements were discussed until a consensus was reached. Due to the heterogeneity of the included studies (e.g. different interpersonal factors and asthma outcomes that were examined across included studies), a quantitative synthesis (i.e. meta-analysis) was not feasible. Therefore, a narrative synthesis approach was used for data synthesis.

Results

Study search results

The PRISMA diagram (Figure 1) shows the literature searching and screening process. In total, 2449 articles were identified from database searching, and one article was identified from the *Connected Paper*. After removing 934 duplicates, 1516 articles were screened for titles and abstracts. One thousand five hundred articles were excluded based on exclusion criteria. Sixteen articles were screened with the full texts. Finally, seven articles were included in the review.

Study characteristics

The characteristics of the included studies are summarised in Table 1. Among the seven included studies that examined the associations of asthma outcomes with interpersonal factors, two studies reported on intimate partners' responses, including partners' appraisal of patients' asthma management (Geden et al., 2002) and partners'

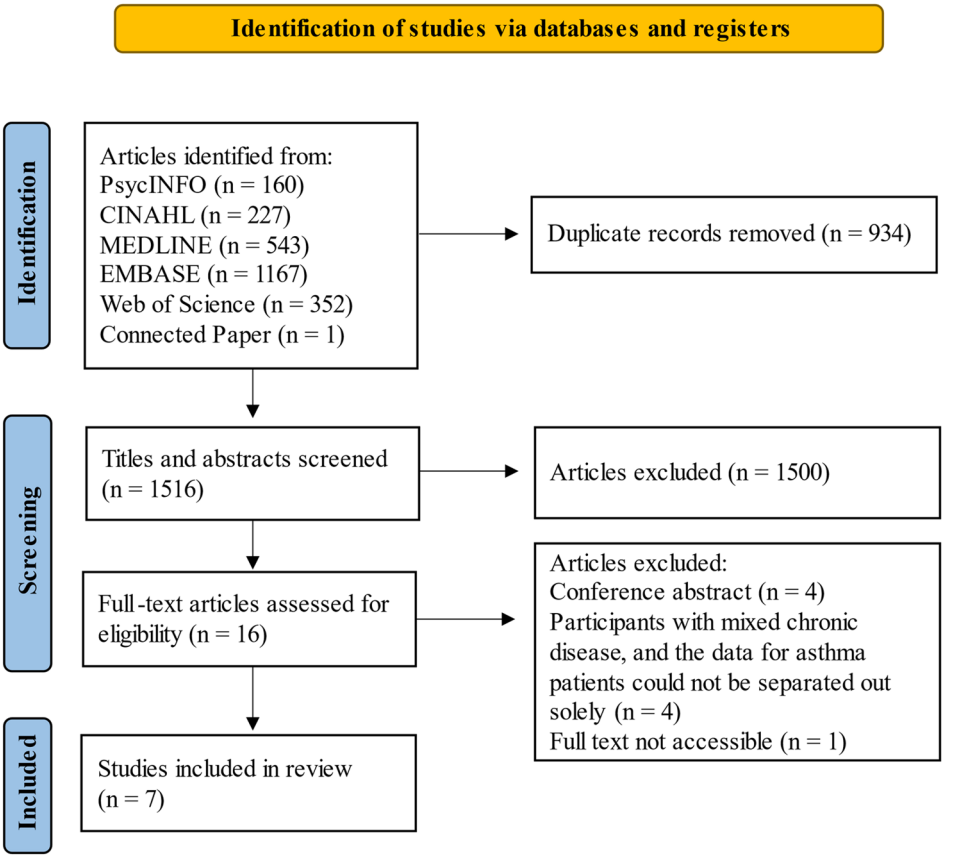

Figure 1. PRISMA flowchart of the selection process.

psychological distress (Afari & Schmaling, 2000), and five studies reported on dyadic factors, including hostile communication (Schmaling et al., 1996; 2009), relationship satisfaction (Giardino et al., 2002; Schmaling et al., 1997), and marital functioning (Furgał et al., 2009). The studies were conducted from 1996 to 2009. Six studies (86%) were conducted in the United States, and one study (14%) was conducted in Poland. In terms of study design, five studies were cross-sectional studies, while the remaining two studies adopted an experimental design. The sample size of included studies ranged from 6 to 131 pairs of couples, and the mean age of participants ranged from 36.11 to 49.87 years. Most participants were married and Caucasian with a college or higher education background. Regarding gender distribution, over 65% of participants with asthma were women in six studies, compared with 57% of female asthma patients in one study. Four studies were conducted on people with mild-to-moderate asthma; two studies involved patients with mixed asthma severity and severe asthma, respectively, and only one study did not report patients' asthma severity.

Risk of bias

The risk of bias assessment for the included studies is shown in Table 2. Overall, two studies were deemed to be "poor quality", four studies were identified as being

Table 1. Data extraction sheet.

			Participants											Study Assessment			
			Patient				Partner										
Authors (year)	Country	Study design	*N*	Female (%)	Mean age (*SD*)	Asthma severity	*N*	Female (%)	Mean age (*SD*)	Ethnicity	Education	Household yearly income	Marital status	Partner's variables	Patient's clinical outcomes	Key results relevant to the research question	Other results
Afari and Schmaling (2000)	USA	Cross-sectional	50	66	36.18 (9.97)	Mild to moderate	50	34	37.16 (10.28)	Caucasian (88%)	College or post-graduate education (72%)	>= $50,000 (56%)	Married (83%)	Psychological distress (BSI)	Disease severity (FEV_1/FVC, PC_{20}), Functional status (MOS SF-36), Medical utilisation, Psychological distress (BSI)	The relationships between partners' responses and patients' clinical outcomes were analysed in two gender groups separately. In the female patient group, partner's global psychological symptom severity accounted for 16% of the variance in patients' physical functioning ($F = 3.63$, $p = 0.02$) and 20% of the variance in patients' total physician visits ($F = 3.59$, $p = 0.03$). In the male patient group, the predicting effects of partners' psychological distress on patients' functional status and healthcare utilization were not significant. Results showed that female patients' poorer physical functioning and increasing physician utilisation were related to their partners' greater psychological distress, while male patients' outcomes were not affected by their partners.	Gender differences were found in patients' psychological distress ($p = 0.02$) and physician utilisation ($p = 0.003$) but not disease severity or functional status. Male asthma patients reported significantly higher levels of psychological distress and used fewer physician services than female patients. There was no significant gender difference in partners' psychological distress.

(*Continued*)

Table 1. Continued.

			Participants											Study Assessment			
			Patient				Partner										
Authors (year)	Country	Study design	*N*	Female (%)	Mean age (*SD*)	Asthma severity	*N*	Female (%)	Mean age (*SD*)	Ethnicity	Education	Household yearly income	Marital status	Partner's variables	Patient's clinical outcomes	Key results relevant to the research question	Other results
Furgał et al. (2009)	Poland	Cross-sectional	131	67	49.87 (13.73)	Mild (37.74%), Severe (34.91%)	131	33	–	–	–	–	–	Family function (FAQ) (This measure describes family functioning at three levels: (1) general level, describing the family as a system; (2) marital level, focusing on relationships in couples; (3) self-assessment level, describing individuals' perception of own functioning in the family. This study was included because the effect of marital level functioning was examined separately)	Dyspnea severity (10-tiered Borg scale of the subjective dyspnea experience), Lung function (spirometry examination), Family function (FAQ)	Significant correlations between couples' perceived marital functioning and dyspnea severity were found. Partners' perceived affective expression ($r = 0.39$, $p < 0.001$) and affective involvement ($r = 0.34$, $p < 0.05$) in the relationships were positively related to patients' dyspnea severity.	Patients' perception of affective expression in the whole family was negatively related to dyspnea severity ($r = -0.24$, $p < 0.05$).

(*Continued*)

Table 1. Continued.

			Participants											Study Assessment			
			Patient				Partner										
Authors (year)	Country	Study design	*N*	Female (%)	Mean age (*SD*)	Asthma severity	*N*	Female (%)	Mean age (*SD*)	Ethnicity	Education	Household yearly income	Marital status	Partner's variables	Patient's clinical outcomes	Key results relevant to the research question	Other results
Geden et al. (2002)	USA	Cross-sectional	73	58	37.92 (13.87)	Not reported	66	31	39.91 (14.25)	Caucasian (75%)	An average 15.39 years of education	< $36,000 (35.6%),$36,000-60,000 (33.9%), > $60,000 (30.5%)	Not reported. All couples had lived in a shared residence for at least five years.	Asthma quality of life (AQoL), Perceived control of asthma (PCAQ), Asthma opinion, Perceived health in general, Family environment (FES), Perception of self-as-carer (SCI)	Asthma quality of life (AQoL), Perceived control of asthma (PCAQ), Asthma opinion, Perceived health in general, Family environment (FES), Perception of self-as-carer (SCI)	Partners' perceptions of patients' general health, asthma severity, and asthma control self-efficacy significantly explained 39% (adjusted $R^2 = 0.37$) of the variance in patients' asthma QoL. Specifically, partners' perceived patients' general health ($\beta = 0.31$, $p = 0.002$) and patients' asthma control self-efficacy ($\beta = 0.21$, $p = 0.046$) were positively associated with asthma QoL, and their perception of patients' asthma severity was negatively related to asthma QoL ($\beta = -0.28$, $p = 0.008$).	Patients' perceptions were positively related to partners' perceptions regarding all study variables (*r*s ranging from 0.32 to 0,74, *p*s ≤ 0.001). The effect of family environment was also examined, but it was not presented in the key results column as it may differ from dynamics in romantic relationships. It showed that family cohesion had a significant main effect on patients' asthma ($F = 4.43$, $p = 0.04$). Compared to patients with low family cohesion, patients with high family cohesion reported higher levels of asthma QoL.

(*Continued*)

Table 1. Continued.

			Participants											Study Assessment			
			Patient				Partner										
Authors (year)	Country	Study design	*N*	Female (%)	Mean age (*SD*)	Asthma severity	*N*	Female (%)	Mean age (*SD*)	Ethnicity	Education	Household yearly income	Marital status	Partner's variables	Patient's clinical outcomes	Key results relevant to the research question	Other results
Giardino et al. (2002)	USA	Cross-sectional	50	66	36.2 (10.0)	Mild to moderate	50	–	–	Caucasian (88%)	College or higher education (72%)	–	Married (82%)	–	Pulmonary function (PC_{20}, FEV_1/FVC), Negative cognition (ACQ), Asthma symptoms (ASC), Relationship satisfaction (DAS)	This study examined how relationship satisfaction influenced the pattern of associations between patients' catastrophic cognitions and asthma symptoms. With the control of pulmonary function, for patients with high relationship satisfaction (above median score of DAS), catastrophic cognitions were related to emotional asthma symptoms (i.e. panic, irritability, anger, and loneliness) (βs ranging from 0.44 to 0.56, $p < 0.05$); while for patients with low relationship satisfaction (below median score of DAS), their catastrophic cognitions were related to physical asthma symptoms, including dyspnea ($\beta = 0.43$, $p < 0.05$) and rapid breathing ($\beta = 0.47$, $p < 0.05$).	Patients' catastrophic cognitions were linked to greater asthma symptoms, especially anger, rapid breathing, and irritability (βs ranging from 0.29 to 0.33, $p < 0.05$), after controlling the level of pulmonary function.

(*Continued*)

Table 1. Continued.

			Participants											Study Assessment			
			Patient				Partner										
Authors (year)	Country	Study design	*N*	Female (%)	Mean age (*SD*)	Asthma severity	*N*	Female (%)	Mean age (*SD*)	Ethnicity	Education	Household yearly income	Marital status	Partner's variables	Patient's clinical outcomes	Key results relevant to the research question	Other results
Schmaling et al. (1996)	USA	Experimental	6	67	45.50	Severe asthma	6	33	–	–	–	–	Married (100%)	Affective state (MAACL), Couple interaction (LIFE)	Pulmonary function variability (PEFR), Affective state (MAACL), Couple interaction (LIFE)	After discussing relationship problems with partners, two patients who experienced less hostility and anxiety reported improved pulmonary function, while the other four patients who reported increasing hostility and depression showed decreased pulmonary function. The correlations between pulmonary function variability and affective states (*rs* ranging from −0.68 to 0.17) and couple interaction (*rs* ranging from −0.17 to 0.29) were not statistically significant due to insufficient sample size.	Female asthma patients showed more reactive pulmonary function than male patients (PEFR *SD*: 1.44 vs. 0.66). Partners showed different responses during the discussion of relationship problems. For patients with increased PEFR, their partners displayed more aversive and less dysphoric behaviours, while for those with reduced PEFR, partners showed less aversive and more dysphoric responses.

(*Continued*)

Table 1. Continued.

			Participants											Study Assessment			
			Patient				Partner										
Authors (year)	Country	Study design	*N*	Female (%)	Mean age (*SD*)	Asthma severity	*N*	Female (%)	Mean age (*SD*)	Ethnicity	Education	Household yearly income	Marital status	Partner's variables	Patient's clinical outcomes	Key results relevant to the research question	Other results
Schmaling et al. (1997)	USA	Cross-sectional	46	65	36.11	Mild to moderate	46	35	37.18	Caucasian (87%)	College or post-graduate education (70%)	>=$50,000 (59%)	Married (83%)	Relationship satisfaction (DAS)	Disease severity (PC_{20}, FEV_1/FVC), Functional status (MOS SF-36), Medical utilisation (MUI), Relationship satisfaction (DAS)	This study examined how asthma-related variables (disease severity, functional status, and medical utilisation) affected couples' relationship satisfaction. Disease severity measured by PC_{20} and medical utilization measured by asthma medication usage significantly accounted for 27% of the variance in patients' relationship satisfaction ($F = 7.06$, $p = 0.003$). More asthma severity ($\beta = -0.32$, $p = 0.03$) and greater use of asthma medications ($\beta = 0.39$, $p = 0.008$) were significantly associated with patients' greater relationship satisfaction.	Patients' asthma-related variables were not related to partners' relationship satisfaction.

(*Continued*)

Table 1. Continued.

			Participants											Study Assessment			
			Patient				Partner										
Authors (year)	Country	Study design	*N*	Female (%)	Mean age (*SD*)	Asthma severity	*N*	Female (%)	Mean age (*SD*)	Ethnicity	Education	Household yearly income	Marital status	Partner's variables	Patient's clinical outcomes	Key results relevant to the research question	Other results
Schmaling et al. (2009)	USA	Experimental	48	67	36.6 (9.8)	Mild to moderate	48	33	–	Caucasian (88%)	College or post-graduate education (73%)	> $50,000 (56%)	Married (81%)	Relationship satisfaction (DAS), Mood state (MAACL), Behavioural couple interaction (LIFE)	Relationship satisfaction (DAS), Asthma symptoms (ASC), Mood state (MAACL), Airflow (PEF), Behavioural couple interaction (LIFE)	This study replicated a previous study (Schmaling et al., 1996) with a larger sample size. After discussing relationship-related problems with their partners for 20 min, patients reported significantly more hostility ($t = -2.1$, $p = 0.044$) and decreased but not clinically significant pulmonary function ($t = 2.8$, $p = 0.009$). Patients' behavioural and emotional changes evoked by interaction with their partners did not predict their post-discussion pulmonary function.	Patients reported emotional asthma symptoms were associated with post-discussion pulmonary function. Specifically, patients who experienced less loneliness ($\beta = 0.21$, $p < 0.001$) and greater anger ($\beta = -0.15$, $p < 0.01$) during asthma attacks tended to report lower pulmonary function after the discussion task.

Note. *N*, sample size; *SD*, standard deviation; BSI, Brief Symptom Inventory; FEV_1/FVC, the ratio of forced expiratory volume in the first second of exhalation to full vital capacity; PC_{20}, the concentration of methacholine (mg/mL) that caused a 20% drop in FEV_1; MOS SF-36, Medical Outcome Study SF-36 Health Survey; FAQ, Family Assessment Questionnaire; AQoL, Asthma Quality of Life; PCAQ, Perceived Control of Asthma Questionnaire; FES, Family Environment Scale; SCI, Self-as-Carer Inventory; ACQ, Agoraphobic Cognitions Questionnaire; ASC, Asthma Symptom Checklist; DAS, Dyadic Adjustment Scale; MAACL, Multiple Affect Adjective Checklist; PEF, Peak Expiratory Flow; PEFR, Peak Expiratory Flow Rate; LIFE, Living in Familial Environments; MUI, Medical Utilization Interview.

Table 2. Quality assessment of the included studies ($k = 7$).

Studies	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Overall quality
Afari and Schmaling (2000)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Fair
Furgał et al. (2009)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Poor
Geden et al. (2002)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Fair
Giardino et al. (2002)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Fair
Schmaling et al. (1996)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Poor
Schmaling et al. (1997)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Fair
Schmaling et al. (2009)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	Good

Note. ● = Yes, quality criteria met; ● = No, quality criteria not met; ● = not reported; ● = not applicable; ● = cannot determine.

Criteria 1 = Was the research question or objective in this paper clearly stated?
Criteria 2 = Was the study population clearly specified and defined?
Criteria 3 = Was the participation rate of eligible persons at least 50%?
Criteria 4 = Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?
Criteria 5 = Was a sample size justification, power description, or variance and effect estimates provided?
Criteria 6 = For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?
Criteria 7 = Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?
Criteria 8 = For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g. categories of exposure, or exposure measured as continuous variable)?
Criteria 9 = Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?
Criteria 10 = Was the exposure(s) assessed more than once over time?
Criteria 11 = Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?
Criteria 12 = Were the outcome assessors blinded to the exposure status of participants?
Criteria 13 = Was loss to follow-up after baseline 20% or less?
Criteria 14 = Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?

of "fair quality", and only one study was assessed as "good quality". The poor-quality ratings were mainly due to the cross-sectional study design, which limits the ability to examine the causal relationships between partner/dyadic variables and patients' outcomes, not providing detailed information about the sample, not controlling the potential key confounders (e.g. gender, age, asthma severity), and limited sample size.

Main results

The findings were grouped based on the types of interpersonal factors of asthma-related outcomes examined in each included study. Specifically, these findings have shown the associations of asthma outcomes with (1) partner responses (appraisal of patients' asthma management and psychological distress) and (2) dyadic factors (hostile communication, relationship satisfaction, and marital functioning). It is noted that no conclusions for relationships between interpersonal factors and asthma outcomes were drawn from this review due to the heterogeneity of included studies (e.g. heterogeneous measures were used across studies).

Partner responses and patient outcomes

Partners' perceptions of patients' asthma management and emotional responses were related to patient outcomes. Partners' views on patients' better health status (indicated by perceived lower severity of asthma and higher levels of general health) and partners' perception of patients' self-efficacy in asthma management were positively related to patients' asthma QoL (Geden et al., 2002). Partners' negative emotional responses (i.e. psychological distress) were linked to patients' poorer physical functioning and more physician utilisation, though these relationships existed in only females with asthma but not for male patients (Afari & Schmaling, 2000).

Dyadic factors and patient outcomes

Communication between partners may influence asthma patients' illness conditions by evoking intense emotional arousal, which has been demonstrated to trigger airway resistance in asthma patients (von Leupoldt & Dahme, 2005). Two experimental studies tested this hypothesis by examining the relationship between emotional change in couple communication and the pulmonary function of patients. Researchers recruited patients and their partners to discuss relationship problems and measured patients' airflow and couples' mood states throughout the experimental period (Schmaling et al., 1996; 2009). In the earlier study with merely six couples, patients reported more hostility, depressive moods, and decreased pulmonary function after discussing the relationship problems with their partners (Schmaling et al., 1996). This result was partially replicated in another study with a sample of 48 pairs of couples, in which patients reported significantly more hostility and decreased pulmonary function after the experiment (Schmaling et al., 2009). Even with an increased sample size, this study found that patients' mood changes evoked during communication with their partners did not predict their post-discussion pulmonary function, but emotional asthma symptoms measured by the Asthma Symptom Checklist (i.e. less loneliness and more anger) of patients were related to lower post-discussion lung function (Schmaling et al., 2009). Although these two studies did not find a significant relationship between couples' hostile communication and patients' pulmonary function, they provided preliminary evidence for the co-occurrence of emotional changes during couples' hostile communication and decreased pulmonary function in people with asthma.

The associations of asthma outcomes with relationship satisfaction have been examined in two cross-sectional studies (Giardino et al., 2002; Schmaling et al., 1997). One study in 50 patients with mild-to-moderate asthma and their partners found that relationship satisfaction moderated the associations of catastrophic cognitions with physical and emotional asthma symptoms (Giardino et al., 2002). Specifically, for patients with high relationship satisfaction, catastrophic cognitions were positively related to emotional asthma symptoms, including panic, irritability, anger, and loneliness. In contrast, for patients with low relationship satisfaction, more catastrophic cognitions were associated with greater physical asthma symptoms such as dyspnea, congestion, and rapid breathing (Giardino et al., 2002). This study suggested that relationship satisfaction may weaken the association of patients' maladaptive cognition

with physiological symptoms. In another study, patients' relationship satisfaction was examined as the dependent variable and was positively associated with asthma severity and medication usage, suggesting that more severe asthma might not necessarily impair relationship satisfaction (Schmaling et al., 1997). It may be interpreted by another study, which found a positive correlation between patients' dyspnea severity and marital functioning (especially affective expression and affective involvement) reported by partners (Furgał et al., 2009). It is possible that when patients experience worsened asthma symptoms, such as more severe dyspnea, partners may provide emotional support to patients by engaging in more affective expression and affective involvement (Furgał et al., 2009), which may be related to patients' increased relationship satisfaction (Schmaling et al., 1997).

Discussion

Given that patients frequently report various aspects of burdens due to their asthma beyond physical symptoms, current asthma management guidelines have called for collaboration from multidiscipline healthcare professionals (such as physicians, nurses, pharmacists, and psychologists) to provide multidimensional support to asthma patients (Global Initiative for Asthma, 2024). This systematic review added to the literature through a psychosocial perspective and helped to understand the relationships between interpersonal factors (i.e. partners' responses to the illness and dyadic factors) and asthma-related outcomes in the context of romantic relationships. Only seven studies which were published before 2010 met the inclusion criteria (e.g. involving both members of the couple) and were included in this review. It is noted that there are some relevant studies which were not included in the current review exploring the role of spousal support from patients' perspective only (De Ridder et al., 2005; Foster et al., 2017; Lind et al., 2015). This suggests that few studies have adopted a dyadic approach (i.e. taking both patients' and partners' perspectives into consideration) when investigating the impact of interpersonal factors in asthma research. Further up-to-date empirical evidence adopting a dyadic approach in this field is warranted.

The current review showed that partners' perception of better patient asthma management (e.g. perceived asthma severity and patient's efficacy to asthma self-management) and less psychological distress were related to better patient outcomes, including increasing asthma QoL, better physical health, and less healthcare use. These results were aligned with the "ABC" framework of psychological factors in asthma (Yii & Koh, 2013), suggesting that patients' asthma outcomes were associated with partners' cognitive and affective factors. These findings were consistent with research on other chronic illness conditions, showing that spouses' confidence in patient self-efficacy of illness management (Gere et al., 2014) and fewer anxiety symptoms (Ivziku et al., 2019) were linked to patients' psychological and physical well-being. Our findings suggested that partners' responses to asthma may play an important role in patients' asthma outcomes. However, due to limited studies in this field, it is still unknown whether other aspects of partners' responses to asthma, such as cognitive appraisals of asthma and behavioural responses, would be associated with patient asthma outcomes. Empirical evidence in newly diagnosed cancer patients

and their partners has shown that partners' cognitive appraisals of the illness significantly affect how patients cope with their illness (Karademas et al., 2019). More specifically, partners' sense of personal control over the disease was positively related to patients' own personal control, which in turn related to patients' adaptive coping strategies, such as problem-solving and dealing with the disease with a positive attitude (Karademas et al., 2019). Moreover, two studies on couples facing chronic obstructive pulmonary disease (COPD), a chronic respiratory disease with symptoms similar to asthma, found that patients' QoL was associated with partners' supportive behaviours (e.g. solving the difficulty together with patients) (Meier et al., 2011; 2012). Further investigation into the associations of patients' asthma-related outcomes with partners' cognitive illness appraisals and behavioural responses is warranted.

The findings on dyadic factors and patients' asthma outcomes varied across the included studies, which may result from differences in research focus and measures of asthma-related outcomes. For example, while two experimental studies investigated the immediate impact of couple communication patterns (measured by behaviour coding) on asthma patients' pulmonary function and found non-significant results (Schmaling et al., 1996; 2009), another two cross-sectional studies showed that relationship satisfaction and marital functioning were positively related to asthma symptom severity, which was assessed by self-reported measurement and physiological tests (i.e. methacholine challenge), respectively (Furgał et al., 2009; Schmaling et al., 1997). This diversity in research focus makes it difficult to compare results across studies and provide a conclusive summary. Future research would benefit from a longitudinal design to examine the long-term effect of dyadic factors on asthma-related outcomes and considerations of both objective and subjective asthma outcomes to capture broader aspects of asthma experience. Furthermore, these results diverged from the general notion and existing literature on various chronic illness conditions, showing that maladaptive marital functioning is negatively related to patients' psychological and physical health (Kiecolt-Glaser & Newton, 2001). The findings presented here suggested that partners of patients with more severe symptoms were more likely to provide emotional support and express emotion (Furgał et al., 2009), which may be associated with increased relationship satisfaction of asthma patients (Schmaling et al., 1997). However, this might not be the case in couples facing severe asthma. Partners of adults living with severe asthma may suffer from impaired QoL and emotional distress because of day-to-day caring burdens (Majellano et al., 2021; 2022), which might weaken their ability to provide emotional support to patients (such as empathically responding to patients' caring needs) and could even trigger their resentfulness toward patients (Foster et al., 2017). Additionally, participants in the included studies were primarily heterosexual and married couples. The relationship dynamics and couple interaction may be different in non-heterosexual relationships and unmarried relationships. Further studies considering these contextual characteristics (e.g. asthma severity, relationship type, and marital status) might provide a further understanding of the relationship dynamics in the context of asthma and the influence of dyadic factors on asthma outcomes.

Interestingly, two included studies found gender differences in the relationships between interpersonal factors and patients' asthma outcomes. Specifically, partners' psychological distress was related to poorer physical functioning and more healthcare

utilisation of females with asthma but not for male patients (Afari & Schmaling, 2000). When discussing relationship problems with their partners, women with asthma showed greater pulmonary function change than male patients, although this change was not statistically significant due to the insufficient sample size (Schmaling et al., 1996). These results suggested that female asthma patients may be more vulnerable to the psychological variable of their partners and couple communication than their male counterparts. This gender difference is partially consistent with previous studies showing that female patients tend to report poor asthma-related outcomes (such as more symptoms, rescue medication usage, and reduced QoL) than male patients (Pignataro et al., 2017). A possible explanation is that these gender differences may result from traditional gender role expectations in intimate relationships, suggesting that women tend to be expected and encouraged to be more attentive to the needs of others than men do (Baider & Bengel, 2001). When it comes to women suffering from illness, they might receive less support from a healthy male partner and, therefore, be placed at higher risk of physical and psychological distress. However, it remains unknown whether such gender differences would present in the current social context, where gender role attitudes have changed and relationship equity has been increasingly emphasised (Grunow et al., 2018). Therefore, these gender differences need to be treated with caution. More up-to-date research, such as research in the context of non-heterosexual relationships, to disentangle the role of gender in the interaction between asthma patients and their partners is needed.

Consistent with the literature on pediatric asthma (Chen & Schreier, 2008; Kaugars et al., 2004; Wood et al., 2015), this review found that proximal psychosocial environment and interpersonal factors within romantic relationships may play important roles in adult patients' asthma outcomes. In addition to intrapersonal psychological factors as proposed in the existing "ABC" framework (Yii & Koh, 2013), this review highlighted that interpersonal psychological factors should also be considered to improve patients' asthma outcomes. Furthermore, this review echoed interpersonal coping theories, including dyadic coping theories, which point out the necessity of adopting an interpersonal orientation to investigate the couple's adaptation to stress when a stressful situation, such as the diagnosis of chronic illness and its daily management, occurs in close and committed relationships (Weitkamp & Bodenmann, 2022).

Limitations

Several limitations in this review should be noted. First, the relatively small number of included studies with different measurements to assess interest variables made it impossible to conduct a meta-analysis and examine the magnitude of the relationships between interpersonal factors and asthma outcomes. Second, the cross-sectional study design adopted by most of the included studies limits the ability to infer causal relationships, which requires longitudinal or more empirical studies to further demonstrate the predictive roles of interpersonal factors in patient

asthma outcomes. Third, the limitations in the samples of included studies, such as the small sample size in one study (Schmaling et al., 1996), the majority of asthma patients being females from the United States and with mild to moderate severity, all couples being heterosexual couples, and most participants were married Caucasian with a college or higher education background, made it difficult to generalise our findings to br'oader populations. Also, despite all included studies adopting a dyadic approach with data collected from both asthma patients and spouses, they did not account for the interdependent nature of the data or use appropriate statistical analytic methods suitable for paired data (Kenny et al., 2006). Finally, broader research solely exploring patient perspectives was not included in this review, in addition to other articles excluded due to the screening criteria (e.g. articles written in non-English language or conference abstracts need to be excluded) and the omission of grey literature, all of which may result in risk of reporting bias.

Clinical implications

This review highlights the importance of involving partners in the asthma management of adult patients in clinical practice. For instance, clinicians could provide education for partners on how to support patients in daily asthma management, such as monitoring symptoms, ensuring medication adherence, and helping to avoid potential triggers (although this should be carefully designed to avoid additional burden of treatment). Health professionals may need to be mindful of partners' mental well-being, especially those caring for patients with severe asthma, as they often experience substantial caring burdens (Majellano et al., 2021). Providing appropriate psychological support and enhancing couples' relationship functioning may help couples manage asthma effectively together and improve asthma and general quality of life outcomes.

Conclusion

In the context of romantic relationships, interpersonal psychological factors play significant roles in adult patients' asthma-related outcomes. This review found that partners' perceptions of patients' better asthma management and less psychological distress were related to increasing asthma QoL, better physical health, and less healthcare use in patients with asthma. In addition, dyadic factors (i.e. marital functioning and relationship satisfaction) were positively linked to asthma symptom severity. Based on these findings, further research on other interpersonal factors, such as partners' cognitive appraisals of the illness and behavioural responses, is warranted.

Ethical approval and informed consent statements

There are no human participants in this article and informed consent is not required.

Authors' Contributions

Liuyu Wei: Conceptualization; data curation; formal analysis; investigation; methodology; project administration; resources; software; validation; visualisation; writing—original draft preparation; writing—review & editing. Becky Band: Conceptualization; methodology; supervision; writing—review & editing. Judit Varkonyi-Sepp: Conceptualization; supervision; writing—review & editing. Amelie Millar: Formal analysis; investigation; validation; writing—review & editing. Ben Ainsworth: Conceptualization; methodology; project administration; supervision; writing—review & editing.

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Data availability

Data sharing is not applicable to this article as no new data were created or analysed in this study. The review was registered with PROSPERO, registration number: CRD42023491356. https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42023491356

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