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DOI:

[10.1093/intqhc/mzy034](https://doi.org/10.1093/intqhc/mzy034)

Document Version

Peer reviewed version

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Citation for published version (APA):

Mimura, C., & Norman, I. J. (2018). The relationship between healthcare workers' attachment styles and patient outcomes: a systematic review. *International journal for quality in health care : journal of the International Society for Quality in Health Care / ISQua*, 30(5), 332-343. <https://doi.org/10.1093/intqhc/mzy034>

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The relationship between healthcare workers' attachment styles and patient outcomes: a systematic review

Abstract

Purpose. To examine whether attachment styles of healthcare workers influence the quality of their relationships with patients, or impact patients' health outcomes.

Data source. Literature database searches on the CINAHL, Cochrane Library, Embase, MEDLINE and PsyCinfo, and hand searching of reference lists of the retained articles.

Study selection. Original empirical studies reporting an analysis of the relationship of interest were selected for review.

Data extraction. Estimates of association between healthcare workers' attachment style and patients' health outcomes were extracted.

Results of data synthesis. Results from 13 studies were mixed in terms of which attachment styles related to patients' perceptions of care or health outcomes, and the evidence overall was of poor quality and methodologically heterogeneous. However, there is limited evidence that secure attachment styles of healthcare workers have little or a negative effect on patients' health outcomes or perceptions in the short term but in the long term have a more positive effect. Conversely, insecure styles tend to have a positive effect in the short term but little or a negative effect on long term relationships. Studies which used self-report attachment measurements tended to report stronger associations with patients' outcome measurements than studies using the interviewer rated Adult Attachment Interview.

Conclusion. It is unclear whether or not there is a relationship between attachment style of health workers and patients' health outcomes. Further research using consistent data collection, especially attachment measurement construct, and analysis methods across studies is required to draw recommendations for clinical practice.

Keywords: attachment style; psychological bonding; health care; outcome assessment; professional patient relationship

Introduction

The quality of the inter-personal relationships between healthcare workers and patients is an important process of care variable and may influence patients' outcomes since it may influence patients' compliance with treatment. Previous studies have demonstrated that, among a wide variety of influential factors, attachment styles are important antecedents of interpersonal relationship quality [1].

Building on Bowlby's attachment theory that conceptualises attachment styles as secure or insecure [2-4], Bartholomew and Horowitz proposed an attachment style model comprising intersecting dimensions of positive and negative perceptions of the self and others [5]. They proposed four attachment styles: secure, dismissing, preoccupied and fearful. People with secure attachment have positive regard for both themselves and others. In contrast, individuals with a dismissing attachment style have a positive self-image but a negative image of others. Those with a preoccupied attachment style have a negative self-image but are positive towards others. People with a fearful attachment style perceive both themselves and others as unworthy and unlikable.

These theories suggest that attachment styles of both the healthcare provider and their patients can influence the quality of clinician-patient relationships. However, research on the association between patient attachment styles and the patient-clinician relationship has been criticised for not having clinical applications [6]. A more productive approach might be to consider the attachment styles of healthcare workers as a potential prerequisite of the quality of patient care. A recent systematic review investigating the impact of therapist attachment style on psychotherapeutic alliance and outcomes, found diverse findings across studies but also some evidence that therapist attachment style is a predictor of the therapeutic alliance and patients' health outcomes [7]. The present review builds on this finding by investigating the relationship between the attachment style of a wider group of healthcare professionals and the quality of patient care.

To assess adult attachment styles in research, a variety of tools have been developed. Some of these involve data collection by interviewer-rating assessment and others through self-report.

Amongst the first group is the Adult Attachment Interview (AAI) [8] which focuses on how interviewees coherently organise their speech with respect to childhood experiences with significant caregivers irrespective of whether they as adults perceive such loving relationships as positive or negative [9]. In contrast, self-report measures ask respondents to report how they think and feel about current close relationships [10].

This review investigates whether there is an association between healthcare workers' attachment styles, measured with the AAI or self-rating tools, and patients' health outcomes or their perception of care provided by their healthcare workers.

Methods

Literature Search

An electronic literature search was performed in February 2017 on the following databases: CINAHL, Cochrane Library, Embase (1974-), MEDLINE (1946-) and PsycInfo (1806-). The search strategy is summarised in Table 1.

The titles and abstracts of all the papers identified were screened to ensure they met the following inclusion criteria:

- a) Published in English or Japanese language,
- b) Report the findings of empirical research studies conducted within a healthcare setting examining attachment styles of any healthcare workers using any measurement tool based on Bowlby's attachment theory, and
- c) Report patients' somatic and/or psychological health response to care using a measure/indicator.

To be included in the review, healthcare workers had to be defined by the study authors as people whose paid employment involved promotion, protection, prevention, curation or improvement of the health of the population [11] in settings where the primary purpose is the treatment and prevention of disease and illness.

In addition to the electronic literature searches, hand searching was conducted by scanning

reference lists of retained articles, relevant review papers and bibliographies. Full texts of any potentially relevant studies were sought, and if they could not be obtained, information on the study was sought from the corresponding author by email.

Retrieved full-text papers were excluded if they met any of the following criteria:

- d) Studies using a simulated intervention, and
- e) Studies in which more than 50% of the healthcare providers were pre-registration students.

These studies were excluded because students are always supervised by senior professionals and their ways of relating patients are likely to be influenced by the supervisor, so the effects of their own attachment styles might be attenuated.

Quality Assessment

We used a standardised quality assessment checklist, the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies by the National Heart, Lung and Blood Institute [12], and modified the phrases to make them applicable to this review (Table 2).

Data Extraction and Analysis

A pre-determined data extraction sheet was used, comprising items as listed in Table 3 and 4. The data needed for assessing the quality of studies (Table 2) were also extracted.

Several studies analysed healthcare workers' attachment measurements combined with other variables and such combinations differed between studies. Therefore, in this review, only estimates for which an attachment measurement was input as a categorical variable in comparative analyses or as a simple independent variable (not an interaction term) in correlational analyses were considered, which enabled us to summarise findings of interest reported across the studies reviewed. Meta-analytical synthesis was not attempted because of methodological heterogeneity across studies. A qualitative sensitivity analysis was additionally conducted (see below).

Review of titles, abstracts and full-manuscripts, data extraction and quality assessment were

conducted by the first author (CM). The results of this analysis were checked by the second author (IJN) who also responded to any queries. Discrepancies were resolved through discussion.

Results

Overview of Included Studies

Figure 1 summarises the progress of papers through different stages of the review. Thirteen papers [13-25] met criteria for inclusion, and were included in the final analysis (Table 3 and 4). No randomised controlled trials or cohort studies were found. Twelve studies were conducted in mental health care settings, and one study in a general somatic health setting. Twelve studies used correlational analysis for examining the association of interest. One study used comparative analysis of t-test, MANOVA and ANOVA.

Attachment Style Measurements

Tables 3 and 4 summarise characteristics and findings of the five studies which gathered data using the AAI and other studies that used self-report attachment measurements. Eight studies used self-report methods, including the Experience of Close Relationship Questionnaire (ECR) [26], the Relationship Questionnaire (RQ) [5], the Relationship Scale Questionnaire (RSQ) [27], the Adult Attachment Scale (AAS) [28] and the Psychosis Attachment Measure (PAM) [29].

Patients' Perception and Health Outcome Measurements

A variety of tools were used to measure patients' perceptions following their care, which were of two types: measures of relationship quality with healthcare workers; and measures of patients' health outcomes. Thus, findings were reviewed for these two outcomes.

The most widely used instrument of relationship quality was the 12-item Working Alliance Inventory (WAI-12) [30]. Other widely used tools were the 36-item Working Alliance Inventory (WAI-36) [31], the Client Attachment to Therapist Scale (CATS) [32] and the Helping Alliance

Questionnaire (HAQ) [33]. Five other scales [34-38] were used, but each scale was not used in more than one study.

Widely used tools to examine patients' health outcomes included the Global Severity Index of the Symptom Check List (GSI) [39] and the Inventory of Interpersonal Problems (IIP) [40]. A variety of nine other measurements were used to collect outcome data [41-49].

Quality Assessment

This review was not concerned with evaluating the effectiveness of an intervention, thus standardisation of the intervention was not a key issue. However, we recognise that the form of intervention could influence patients' perceptions and health outcomes, and that standardising interventions would control for this bias to some extent. Therefore, we considered interrupted time series studies as more robust than repeated measure study designs, and cross-sectional designs as the lowest level of evidence. Tables 3 and 4 summarise studies in this hierarchy of study designs grouped by use of similar attachment measurements.

A frequent limitation of the studies was their small sample size, especially of healthcare workers. Only two studies used a sample of more than 50 of healthcare workers (mean = 30.6, sd = 18.4). Only one study reported a power calculation. Another limitation of the studies was that they reiterated healthcare workers' attachment measurement in analysis in which the nested nature of patient data on healthcare worker data was not accounted for; this statistical problem was identified in three studies. In addition, the duration of clinical inter-personal relationship was relatively short in most studies. Finally, the selection of tools tended to be based on reliability/validity evaluated in previous research, and most studies (n = 9) did not sufficiently test the reliability/validity tools selected in their study setting.

In using the quality assessment checklist, we regarded Items 7, 9, 11 and 12 of the checklist to be most important in assessing the quality of studies for the purpose of this review. However, we did not simply use the total number of "yes" ratings among these four items, or among whole the set of

items, to rate studies as good, fair or poor; rather we considered risk of selection bias, information bias, measurement bias, or confounding. In addition, if the statistical analysis was assessed as flawed, then the study was rated as poor. One study was rated as good and six each as fair or poor.

Findings

Relationship Quality

In the studies which used the AAI for measuring healthcare workers' attachment style (Table 3), one study found that at an early stage of treatment, patients seen by securely attached therapists rated their working alliance as poorer than those patients of insecurely attached therapists. However, approximately 3 months later the secure attachment group rated their working alliance more positively than the insecure attachment group [14]. On the other hand, statistically significant results indicated that the more healthcare workers were dismissing, the more their patients' attachment to them were avoidant or fearful [13] and patients were less satisfied with the therapeutic relationship [15].

Within the studies using self-report (Table 4), two studies found that healthcare workers' secure attachment was not associated with patients' perception of working alliance [18, 19]. However, in one study, healthcare workers' close (secure) attachment style was found to be associated with patients' positive perception of their working alliance [21].

Statistically significant results showed that if healthcare workers were more avoidant [23] or anxious [22] patients believed their attachment to healthcare workers to be less secure. One study showed a positive relationship between dependence of healthcare workers and patients' perception of the quality of their working alliance [21].

Patients' Health Outcome

Three studies using the AAI [13, 16, 17] explored the association between healthcare workers' attachment style and patients' health conditions, and all analyses produced statistically insignificant

results (Table 3).

As for studies using self-report attachment measurements (Table 4), four studies examined the association between attachment and patients' health outcomes [18, 22-24]. Statistically significant relationships were found between insecure attachment style (fearful, preoccupied and dismissing) and anxiety, somatic symptoms or interpersonal problems [18] and between insecure attachment style (anxiety and avoidant) and counseling outcome. In contrast, one study showed that patients treated by securely attached healthcare workers had worse interpersonal problems than those cared for by insecurely attached workers, and that secure attachment style of healthcare workers was associated with higher levels of anxiety and depression in patients [24].

Sensitivity analysis

Of the 14 publications that could not be retrieved (see Figure 1), abstracts were available for 12. One was found to report findings from the same study [50] as one of the studies included in the review [21], thus it was excluded. Six out of 11 abstracts reported findings of interest [51-56].

As with the studies included in the review, study abstracts also reported mixed results. However, studies which investigated early stages of therapeutic relationships tended to show that healthcare workers' attachment styles were not associated with patients' outcomes [51, 53, 56] and that secure attachment styles of healthcare workers were associated with poorer patients' outcomes [51]. One study indicated an association between healthcare workers' insecure attachment styles and poorer patient ratings of alliance [56]. In addition, two studies reported a positive influence of securely attached workers on patients' response/outcomes compared to that of insecurely attached workers [54, 55]. These findings are largely consistent with the conclusion of this review.

Discussion

Comparison between Interviewer-Report and Self-Report Attachment Measurements

Studies using self-report measures appear to be more likely to detect a relationship between

attachment styles and relationship quality or patients' health outcomes than studies using the AAI and these relationships reported are generally statistically stronger (Tables 3 and 4). This difference might be explained by the different attachment constructs as described earlier. Self-report attachment measures study an entity which is similar to therapeutic working alliance. These findings support previous studies which conclude that the AAI and self-report attachment measures measure different aspects of attachment and are not interchangeable [57, 58].

Synthesis of Overall Findings

This review shows that there is variation across studies regarding the association between attachment style of healthcare workers and patients' outcome, and that associations, if any, are weak to moderate. Hence it is difficult to draw firm conclusions. This finding supports the conclusion of a recent systematic review on the role of psychotherapist attachment style in therapeutic alliance and outcome [7]. However, close inspection of the associations reported by studies included in this review shows that associations between secure attachment style and positive patients' perception of relationship quality or health outcomes tend to be positive in direction, whereas associations between insecure dimensions of attachment style (dismissing, preoccupied, fearful, avoidant, anxious and dependent) and patients' perceptions of relationship quality or health outcomes tend to be negative in direction, irrespective of whether the AAI or self-report was used.

Findings from the two studies that investigated change in patients' response over time [14, 22] suggest that secure attachment styles of healthcare workers tend to have little or a negative effect on patients' health outcomes or perceptions in the short term, but in the long term tend to have a more positive effect. In contrast, insecure styles tend to have a positive effect in the short term but little or a negative effect in long term relationships. These findings are in line with Bartholomew and Horowitz' model of the self and others in relation to attachment style [5] discussed earlier. Healthcare workers with positive self-perceptions (namely secure or dismissing attachment styles) might appear superior and overbearing to patients at an early stage of the relationship, which may in turn contribute

to a negative effect on patients' health conditions or perceptions. In contrast, those healthcare workers with negative images of self (namely dependent, preoccupied, fearful or anxious attachment styles) are likely to be valued by patients at the beginning of therapeutic contact because of the tendency of these health workers to invest highly in establishing a rapport with patients. However, healthcare workers hidden negative model of either themselves or others may present to patients in long term relationships as unsure, inconsistent or distant attitudes, which might reduce patients' feeling of safety and support.

Practical Implications

It is now common practice for higher education institutions to screen applicants to healthcare programmes for empathy and positive attitudes towards patients which are considered prerequisites of high quality health care, although valid and reliable screening tools are in short supply. We are not aware of attempts to screen for attachment style when recruiting psychotherapy practitioners. Most theorists of adult attachment claim that attachment patterns in adulthood consist of generalised thoughts, feeling and expectations regulating the way that an individual engages in close relationships [59]. Attachment styles may have potential as valid predictors of the quality of interpersonal relationships between professional health care providers and patients, although more research would be needed to establish this.

Knowledge of their attachment style may assist healthcare workers to enhance the quality of their care. In addition, healthcare workers may be able to modify attachment styles of patients in positive ways [60]. If patients who experienced rejecting and neglectful treatment in their childhood receive, as adults, responsive and supportive caregiving from healthcare workers, it seems possible that their internalised working model of relationships could be modified with resulting benefits for their health and wellbeing.

Limitations

This review retrieved a large number of papers, however, few papers were included in the analysis. Most of these studies were conducted in Western countries, which may induce cultural bias. The literature search sought only published or grey literature, which may have led to some selection bias.

The healthcare workers and patients assessed were predominantly from mental health care settings. However, patients in physical care settings are usually treated by multiple healthcare workers and relationships between patients and professional carers may be relatively superficial. Kafetsios et al.'s study [20] suggests that in such cases, the influence of attachment style of care providers on patients' outcomes and perceptions are likely to be attenuated and therefore difficult to detect.

This review included only uncontrolled before-after studies and cross-sectional studies. We acknowledge the limitation of these research designs in evaluating cause and effect relationships.

Future Research

One of the main limitations of studies conducted hitherto is use of a variety of measures and so constructs of attachment style and health outcomes, which make it difficult to compare the findings of different studies and so draw definitive conclusions. Surveying larger samples of the same number of healthcare workers and patients is also desirable because this would reduce the bias of repeated variable data. Future studies could also investigate the effect of attachment styles of healthcare workers on patients' response over time rather than over short periods or at a single time point.

Conclusion

The results of this review are mixed, and there is currently no robust, statistically significant evidence of any relationship between attachment style of healthcare workers and patients' health outcomes. It is uncertain whether this is due to the poor quality of the available evidence, or because there is no relationship, and so this question may not be a priority for future research.

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Table 1. Database literature searching strategy

Keywords	
Population facet	Measurement facet
doctor psychiatrist nurse practitioner clinician therapist psychologist counsellor health worker healthcare worker health professional healthcare professional	attachment Adult Attachment Interview Adult Attachment Scale Attachment Style Questionnaire Adult Attachment Style Measure Experience in Close Relationship Scale Self-Reliance Inventory
Strategy	
<ol style="list-style-type: none"> 1) Keywords were truncated where applicable and MeSH terms were also used including all subheadings where available. 2) Keywords and terms were combined with the boolean operator OR within each facet. 3) These combinations of the two facets were further combined with the boolean operator AND. 4) Studies were limited to those using humans. 	

Table 2. Quality assessment checklist: a modification of Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (NHLBI 2014)

Item	Yes	C/D, N/A or N/R*	No
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
Overall quality:	Good	Fair	Poor

Note. * C/D = cannot determine, N/A = not applicable, N/R = not reported

Table 3. Characteristics, findings and appraisals of studies using Adult Attachment Interview

Design and Setting	Population and Sampling	Attrition or response rate	Relationship/ intervention duration	Workers' attachment measure [measure point]	Patients' outcome measure [measure point]	Statistical analysis and Findings		Quality assessment
						Relationship quality	Health outcome	
Petrowski et al. (2013)								
Repeated measure design Germany A university hospital inpatient setting	22 therapists 15 psychologists 7 physicians Sampling not clear 429 patients Sampling not clear (randomly assigned to therapists)	Not reported	12 sessions (average 62.5 days SD = 28.45)	AAI [pre therapy]	GSI CATS [post therapy]	Hierarchical linear model · AAI(secure-insecure) not associated with CATS(secure) β not reported ($p>0.05$) · AAI(dismissing-preoccupied) not associated with CATS(preoccupied/merger) $\beta=-0.88$ ($p=0.06$) · AAI(dismissing-preoccupied) associated with CATS (avoidant/fearful) $\beta=0.94$ ($p=0.03$)*	Pearson correlation · AAI(secure-insecure) not correlated with GSI $r=-0.06$ ($p=0.07$) · AAI(dismissing-preoccupied) not correlated with GSI $r=-0.12$ ($p=0.51$)	Fair [7-2]
Sibrava (2009)								
Repeated measure design Not clear	4 therapists Sampling not clear 69 clients Sampling not clear	Not reported	14 weekly sessions (1.5 ~ 2 hours)	AAI [pre therapy]	WAI-36 [end of 2,5,10,14 sessions]	Hierarchical linear model · AAI associated with WAI [at session 2 AAI(secure) showed lower WAI than AAI(insecure), at session 14 AAI(secure) showed higher WAI than AAI(insecure)] $\beta=0.62$ ($p<0.05$)*		Poor [6-2] Small sample size in therapists
Petrowski et al. (2011)								
Repeated measure design Germany A university hospital inpatient setting	19 therapists 13 psychologists 6 physicians Sampling not clear 59 patients Sampling not clear (randomly assigned to therapists)	Not reported	Not clear	AAI [pre therapy]	HAQ [post therapy]	Hierarchical regression · AAI(secure-insecure) not associated with HAQ (statistics not reported) · AAI(dismissing-preoccupied) associated with HAQ(relationship) $\beta=-0.65$ ($p=0.02$)* with HAQ(outcome) $\beta=-0.65$ ($p<0.01$)* · In all other 7 models, AAI(secure-insecure) or AAI(dismissing-preoccupied) not associated with HAQ(relationship) or HAQ(outcome) (statistics not reported)		Poor [5-1] Repeated data of therapists in analysis

Schauenburg et al. (2010)								
Repeated measure design	31 therapists 27 physicians 4 psychologists Sampling not clear	Not reported	Mean treatment duration 12.01 weeks (SD=5.4)	AAI [pre therapy]	GSI IIP IS [pre, post therapy] HAQ [post therapy]	Hierarchical linear model · AAI(secure-insecure) not associated with HAQ $\beta=0.07$ (p=0.53) · AAI(dismissing-preoccupied) not associated with HAQ $\beta=0.10$ (p=0.66)	Hierarchical linear model · AAI(secure-insecure) not associated with GSI $\beta=0.07$ IIP $\beta=0.07$ IS $\beta=-0.22$ (all p>0.05) · AAI(dismissing-preoccupied) not associated with GSI $\beta=-0.01$ IIP $\beta=-0.06$ IS $\beta=-0.14$ (all p>0.05)	Poor [5-1]
Germany 2 psychotherapy hospitals, inpatient settings	1381 patients assigned to therapists in consecutive order Sampling not clear							
Tyrrel et al. (1999)								
Cross-sectional study	21 case managers Sampling not clear	Not reported	Mean dyad relationship 31 months (SD=17, range=7-69)	AAI	WAI-36 QLI GAF BDI Psychiatric hospitalisation days in previous 1 year	Correlation · AAI(dismissing-preoccupied) not correlated with WAI $r=0.07$ (p not reported) Hierarchical regression · AAI(dismissing-preoccupied) not associated with WAI $\beta=0.04$ (p not reported)	Correlation · AAI(dismissing-preoccupied) not correlated with QLI(global) $r=0.02$ GAF $r=0.23$ QLI(relation-q) $r=-0.08$ BDI $r=0.10$ QLI(relation-s) $r=0.10$ Hospitalization $r=0.06$ (p not reported) Hierarchical regression · AAI(dismissing-preoccupied) not associated with QLI(global) $\beta=-0.03$ GAF $\beta=0.20$ QLI(relation-q) $\beta=-0.17$ BDI $\beta=0.10$ QLI(relation-s) $\beta=0.02$ Hospitalization $\beta=0.01$ (p not reported)	Poor [5-2] Repeated data of therapists in analysis
US A community-based setting	54 clients Sampling not clear							

Note. **Healthcare workers' attachment style measure:** AAI = Adult Attachment Interview (category: secure, dismissing, preoccupied, unresolved) (score: secure-insecure, dismissing-preoccupied)

Relationship quality measure: CATS = Client Attachment to Therapist Scale (subscale: secure, avoidant/fearful, preoccupied/merger); WAI-36 = Working Alliance Inventory 36-Item Version; HAQ = Helping Alliance Questionnaire (subscales: relationship satisfaction, outcome satisfaction)

Health outcome measure: GSI = Global Severity Index of the Symptom Checklist; IIP = Inventory of Interpersonal Problems; IS = Impairment Score, caregiver-rating; QLI = Quality of Life Interview (subscale: global life satisfaction, relationship quality, relationship satisfaction); GAF = Global Assessment of Functioning; BDI = 13-item Beck Depression Inventory

Findings: * = statistically significant

Quality Assessment: [the number of 'Yes' out of 14 items in total - the number of 'Yes' among items 7, 9, 11 and 12] (see Table 1)

Table 4. Characteristics, findings and appraisals of studies using self-report adult attachment measurements

Design and Setting	Population and Sampling	Attrition or response rate	Relationship/ intervention duration	Workers' attachment measure [measure point]	Patients' outcome measure [measure point]	Statistical analysis and Findings		Quality assessment
						Relationship quality	Health outcome	
Bruck et al. (2006)								
Interrupted time series study US A medical centre outpatient service	26 therapists psychologists psychiatrists social workers Convenience sampling 26 patients Recruited through advertisement	20 patients dropped out from 46 (43%)	30 sessions	RSQ [pre therapy]	WAI-12 SEQ [6th session] TC GAS SCL IIP [post therapy]	Pearson correlation · RSQ not associated with WAI, SEQ or TC (statistics not reported)	Pearson correlation · RSQ(fearful) associated with GAS $r=-0.41$ (p=0.05)* · RSQ(preoccupied) associated with GAS $r=-0.35$ (p=0.05)* SCL $r=-0.30$ (p=0.05)* · RSQ(dismissing) associated with IIP $r=-0.30$ (p<0.05)* · All other correlations not significant (statistics not reported)	Fair [7-2]
Bucci et al. (2015)								
Cross-sectional study UK Primary care psychology services	30 therapists psychologists practitioners counsellors other workers Convenience sampling 30 clients Recruited by therapists (next client at least 3 sessions)	12 clients out of 42 not answered (29%)	At least 3 sessions	RQ	WAI-36 PHQ GAD	Spearman correlation · RQ(secure) $\rho=-0.13$ (p=0.49) · RQ(fearful) $\rho=-0.17$ (p=0.38) · RQ(preoccupied) $\rho=-0.08$ (p=0.67) · RQ(dismissing) $\rho=0.06$ (p=0.74) all not associated with WAI Spearman correlation, clients split low/high (by median of PHQ + GAD) symptom · RQ(fearful) associated with WAI in high symptom clients $\rho=-0.63$ (p=0.02)* · All other correlations not significant (statistics not reported)		Fair [5-2]
Kafetsios et al. (2016)								
Cross-	40 doctors	100%	Average	RQ	PSQ	Multilevel model		Fair

sectional study	(various specialities) Sampling not clear	(no one refused)	contact time = 34 months 27days	(converted into avoidant and anxious)		· RQ(avoidant) not associated with PSQ $\beta=-0.006$ ($p>0.10$) · RQ(anxious) not associated with PSQ $\beta=-0.009$ ($p>0.10$)		[7-2]
Greece Private and public system	160 patients Sampling not clear							
Dunkle & Friedlander (1996)								
Cross-sectional survey	73 therapists Convenience sampling	29% (data of 73 dyads / 252 packets mailed)	3 to 5 sessions	AAS	WAI-12	Correlation · AAS(close) correlated with WAI(total) $r=0.39$ WAI(task) $r=0.34$ WAI(bond) $r=0.41$ WAI(goal) $r=0.32$ (all $p<0.01$)* · AAS(depend) correlated with WAI(total) $r=0.42$ WAI(task) $r=0.37$ WAI(bond) $r=0.44$ WAI(goal) $r=0.36$ (all $p<0.01$)* · AAS(anxiety) not correlated with WAI(total) $r=-0.16$ WAI(task) $r=-0.09$ WAI(bond) $r=-0.22$ WAI(goal) $r=-0.12$ (all $p>0.05$) Regression · AAS(close) associated with WAI(bond) $\beta=0.38$ ($p=0.01$)* · AAS(depend) not associated with WAI(bond) $\beta=0.31$ ($p=0.09$) · AAS(anxiety) not associated with WAI(bond) $\beta=0.16$ ($p=0.37$)		Fair [6-3]
US 15 university counselling centres, 6 clinics	73 clients Selected by therapists							
Wiseman & Tishby (2014)								
Repeated	27 therapists	13	32	ECR	OQ-45	Hierarchical mixed model	Hierarchical linear model	Good

measure design	psychologists social workers Convenience sampling	clients dropped out from 67 (19%)	sessions (50-minutes session, once a week)	[pre therapy]	[pre, 5th, 15th, 23th, 28th session]	· ECR(anxiety) associated with CATS at 5th $\beta=-0.23$ ($p=0.05$)* · All other association not significant [ECR(anxiety)(avoidance) & CATS at 5th, 15th, 28th session] (statistics not reported)	· ECR(anxiety) $\beta=0.12$ ($p>0.05$) · ECR(avoidance) $\beta=-0.07$ ($p>0.05$) not associated with OQ change	[9-4]
Fuertes et al. (2007)								
Cross-sectional survey	59 therapists Random sampling from American Counselling Association	20% (data of 59 dyads / 300 therapists selected)	At least 5 sessions (median=16, n=30)	ECR	WAI-12 CATS RRI EUS COM	Correlation · ECR(avoidance) associated with CATS(secure) $r=-0.27$ ($p<0.05$)* · All other correlations not significant [ECR(anxiety)(avoidance) & WAI, RRI, CATS(secure)(avoidant/fearful)(preoccupied/merger), EUS] $r=-.44$ to $.05$ (p not reported)	Correlation · ECR(avoidance) correlated with COM $r=-.45$ ($p<0.001$)* · ECR(anxiety) correlated with COM $r=-.52$ ($p<0.001$)* Hierarchical regression · ECR(anxiety) associated with COM $\beta=-0.41$ ($p<.002$)*	Fair [7-3]
Wongpakaran & Wongpakaran (2012)								
Cross-Sectional study	13 therapists psychiatrists residents Sampling not clear	Not clear	Not clear (each session 5 minutes to more than 1 hour)	ECR (secure or preoccupied)	WAI-12 PDQ	t-test · WAI not differed by ECR (statistics not reported) MANOVA · ECR not associated with WAI (statistics not reported)	t-test · PDQ(interpersonal difficulties) differed by ECR(secure) 14.12 (SD=4.20) ECR(preoccupied) 12.74 (SD=4.82) ($p=.026$) * ANOVA · ECR(secure) associated with worse PDQ(anxiety) $\beta=8.95$ ($p=0.001$)* worse PDQ(depression) $\beta=8.25$ ($p=0.002$)* · ECR(secure) not associated with PDQ	Poor [6-1] Very short relationship duration ECR cut-off not clear

							(interpersonal difficulty) $\beta=2.02$ ($p=0.291$)	
Berry & Greenwood (2016)								
Cross-Sectional study UK Community mental health service	33 care co-ordinators 24 nurses 5 occupational therapists 3 social workers 1 clinical psychologists Sampling not clear 61 patients with psychosis Sampling not clear	Not reported	3 or more months	PAM	WAI-12	Correlation · PAM(anxious) not correlated with WAI(total) $r=-0.06$ ($p>0.05$) · PAM(avoidant) not correlated with WAI(total) $r=0.04$ ($p>0.05$)		Poor [6-2] Repeated data of therapists in analysis

Note. **Healthcare workers' attachment style measure:** RSQ = Relationship Scale Questionnaire (subscale: secure, dismissing, preoccupied, fearful); RQ = Relationship Questionnaire (subscale: secure, dismissing, preoccupied, fearful); AAS = Adult Attachment Scale (subscale: depend, anxiety, close); ECR = Revised Experience of Close Relationship Questionnaire (subscale: anxiety, avoidance); PAM = Psychosis Attachment Measure (subscale: anxious, avoidant)

Relationship quality measure: WAI-12 = Working Alliance Inventory 12-Item Version (subscales: bond, task, goal); SEQ = Session Evaluation Questionnaire; TC = Target Complaints; PSQ = Patient Satisfaction Questionnaire; WAI-36 = Working Alliance Inventory 36-Item Version; CATS = Client Attachment to Therapist Scale (subscale: secure, avoidant/fearful, preoccupied/merger); RRI = Real Relationship Inventory; EUS = Empathic Understanding Scale

Health outcome measure: GAS = Global Assessment Scale; SCL = Symptom Checklist 90 Revised; IIP = Inventory of Interpersonal Problems; PHQ = Patient Health Questionnaire 9-Item Version (depression scale); GAD = General Anxiety Disorder Assessment; OQ = Outcome Questionnaire (symptom distress, interpersonal problem and social role measure); COM = Counselling Outcome Measure; PDQ = Psychological Distress Questionnaire (subscales: anxiety, depression, interpersonal difficulties)

Findings: * = statistically significant

Quality Assessment: [the number of 'Yes' out of 14 items in total - the number of 'Yes' among items 7, 9, 11 and 12] (see Table 1)

Figure 1. Flow diagram of literature search

