Team Processes in HAI Teams: A Systematic Review

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Abstract:

As Artificial Intelligence (AI) continues to be incorporated into the workforce, understanding the dynamics of human-AI (HAI) collaboration becomes increasingly crucial. HAI collaboration has developed to the point of teaming, where AI can engage in mostly autonomous tasks. One method of understanding human-human (HH) teaming is through team processes. Team processes are a wide range of coordinated actions and behaviours that exist within a team. This systematic review will explore HAI teaming through team processes. Specifically, it identifies whether team processes are present in HAI teams and what impact on performance they have. The review searches seven databases for studies containing a team process and performance outcome. 20 papers were identified to meet to inclusion criteria, and each passed a risk of bias assessment. The results found that team processes did exist in HAI teams, with most studies including multiple team processes. Over 75% of coded team processes displayed positive relationships with performance. Team communication emerged as a critical process in HAI teaming, significantly contributing to performance outcomes and facilitating the effectiveness of other team processes. Team communication proved particularly pivotal when it was adaptive and transparent, and displayed interdependent relationships with coordination and trust. Overall, the results of this systematic review indicate that team processes are present in HAI teaming and are highly related to performance outcomes.

Declaration:

This thesis contains no material which has been accepted for the award of any other degree of diploma in any University, and, to the best of my knowledge, this thesis contains no material previously published except where due reference is made. I give permission for the digital version of this thesis to be made available on the web, via the University of Adelaide's digital thesis repository, the Library Search and through web search engines, unless permission has been granted by the School to restrict access for a period of time.

Disclosure Statement:

In the preparation of this thesis I used OpenAI ChatGPT3.5 to provide feedback on the structure of my introduction and discussion. After using this tool to refine a basic structure, I wrote these sections myself. I drafted all other sections without AI assistance.

I take full responsibility for the content of the thesis, having reviewed and edited the content, and verified all original sources relied upon.

Contributor Role Table:

ROLE	ROLE DESCRIPTION	STUDENT	SUPERVISOR 1	SUPERVISOR 2
CONCEPTUALIZATION	Ideas; formulation or evolution of overarching research goals and aims.	X	X	X
METHODOLOGY	Development or design of methodology; creation of models.	X	X	X
PROJECT ADMINISTRATION	Management and coordination responsibility for the research activity planning and execution.	X	X	X
SUPERVISION	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team.	X	X	X
RESOURCES	Provision of study materials, laboratory samples, instrumentation, computing resources, or other analysis tools.	X	X	X
SOFTWARE	Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code.			
INVESTIGATION	Conducting research - specifically performing experiments, or data/evidence collection.	X		
VALIDATION	Verification of the overall replication/reproducibility of results/experiments.	X	X	X
DATA CURATION	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later re-use.			
FORMAL ANALYSIS	Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data.	X		
VISUALIZATION	Visualization/data presentation of the results.	X		
WRITING – ORIGINAL DRAFT	Specifically writing the initial draft.	X		
WRITING – REVIEW & EDITING	Critical review, commentary or revision of original draft	X	X	X

Introduction

Recent developments in Artificial Intelligence (AI) have generated complex workplace applications across multiple disciplines. Previously, AI use has been quite limited, usually requiring human oversight to minimise inaccuracies and mistakes (Fanti & Moggi, 2022). However, modern technological innovations have allowed rapid development in AI complexity, which has created a growing capacity for applications in compound tasks (Fanti & Moggi, 2022). Current literature aims to investigate how humans and AI can best collaborate in team-like structures (Arslan et al., 2021). Human-AI (HAI) teaming has become increasingly recognised as a powerful approach for solving complex problems and enhancing performance across various domains (Islam et al., 2022). Thus, research on HAI teaming has become crucial for understanding what makes them most effective. One method for improving HAI team performance could be team processes, which are highly relevant to performance in human-human (HH) teams (Marks et al., 2001). HAI teaming is at the forefront of research across multiple disciplines, and grounding HAI teaming in HH team dynamics can provide a foundation for future HAI team research.

What is a team?

Teaming refers to collaboration and coordination between individuals to achieve a common goal (Mathieu et al., 2017). Fundamentally, teams require at least two members who may have different responsibilities or roles depending on the task at hand (Mathieu et al., 2017). Teaming research investigates numerous organisational and social factors that seek to explain what attributes generate effective teaming (Kozlowski & Ilgen, 2006). Teaming factors can include anything from how teams communicate to whether teams operate virtually or face-to-face (Chudoba et al., 2005; Mathieu et al., 2017). Recent technological developments in AI sophistication have led to the incorporation of AI systems into human teams, creating new challenges in the form of HAI teaming.

What is a Human-AI team?

HAI teaming involves the utilisation of AI technology into a HH team structure (O'Neill et al., 2020; Lyons et al., 2021). A key goal of HAI teaming is the leverage of complementary skills and abilities of both humans and AIs (Xia, 2023). AI's computational capabilities far surpass human levels in some domains, allowing the leverage of certain attributes to produce greater team performance (Dwivedi et al., 2021). For example, AI has applications within healthcare settings, where it can be used by medical practitioners to help make more informed decisions (Cai et al., 2019; Xia, 2023). It is crucial to understand the full capabilities of AI systems when engaging in HAI teaming so that appropriate tasks can be assigned (Cai et al., 2019; Tomsett et al., 2020). Notably, AI systems are not yet entirely autonomous, but their increasing capacities are sufficient to permit HAI teaming (Endsley, 2017; Frank et al., 2023; Lorenzini et al., 2023; Schneider & Breitinger, 2023).

Why HAI Teaming is Important

Research allows for the understanding of the risks, benefits, and consequences of incorporating AI systems into human teams (Dafoe et al., 2021). Research can induce the identification of specific areas and contexts where the use of AI systems is most appropriate and beneficial for humans (Islam et al., 2022). HAI teaming is predominantly utilised in safety-critical domains, such as healthcare, finance, and cyber security (Islam et al., 2022). To further the diversity of HAI applications, understanding how optimal collaboration between humans and AI systems is crucial. To reach a point where AI systems have applications in all domains, it will be essential to specify the best methods for integrating human and AI capabilities into cohesive teams (Rezwana & Maher, 2022).

Team Processes

Researchers have identified numerous distinct aspects of understanding teaming, such as team processes. Team processes are defined as the activities and interactions that team members partake in during their collaboration to achieve a common goal (Marks et al., 2001). Team processes are separated into several key facets, such as communication, coordination, and decision-making. The

goal of team processes is to foster the development and maintenance of more productive teams, with high-performing teams shown to exhibit team processes (Marks et al., 2001). Since team processes have a substantial impact on human-human teaming, they may inform the development of HAI teaming.

In HH teaming, trust is foundational to effective teamwork. It involves the integrity, competence, and reliability of all team members (Schaefer et al., 2016). Trust allows for other team processes to effectively exist within a team, facilitating communication, coordination, and collaboration (Schaefer et al., 2016). Furthermore, trust is also impacted by other team processes, such as communication strategies (Germain, 2011). In HAI teaming, trust concerns human trust in the AI agent and/or other human team members (Glikson & Woolley, 2020). Much like in HH teaming, HAI trust fosters the development of other team processes such as communication (Hou et al., 2023; Liu, 2022). Similarly, trust in AI systems can be increased by focusing on collaboration through the implementation of team communication (Hancock et al., 2021; Rheu et al., 2021). Trust relationships are very similar in HH and HAI teaming, and this relationship may help explain performance outcomes (Glikson & Woolley, 2020).

Trust in both HH and HAI teams fosters team communication (Schaefer et al., 2016; Liu, 2022). Effective team communication refers to the sharing of information and allows for the development of coordinating actions within teams (Marks et al., 2001). In HH teams, effective communication improves team members' knowledge leading to better decision-making and problem-solving (Mathieu et al., 2008). In HAI teaming, communication is a significant component of collaboration (O'Neill et al., 2022). AI systems that mirror human communication strategies create higher levels of trust in humans, and better performance outcomes (Guzman et al., 2020; Hancock et al., 2021; Lockey et al., 2021; Schecter et al., 2023). Specifically, communication transparency has been identified as significant for HAI teaming (Göbel et al., 2022; Meske, & Bunde, 2020; Zhao et al., 2022). AI transparency refers to the AI's ability to articulate and explain its decisions (Gilpin et al.,

2020). Transparency has been shown to facilitate higher trust in the system and promote better team performance (Göbel et al., 2022; Meske, & Bunde, 2020; Vössing et al., 2022; Zhao et al., 2022). Both HH and HAI teams benefit from specific communication strategies. Gaining an understanding of what strategies are most effective in HAI teaming contexts may lead to more significant performance benefits.

Another key team process that relates to trust is team coordination. Team coordination involves the alignment of individual efforts to achieve a common goal (Ji & Yan, 2020; Li & Liao, 2014). Coordination involves task allocation, resource management, and synchronization of activities (Mathieu et al., 2008). Team coordination has also been investigated in HAI team contexts (Schneider et al., 2021). One study identified that HAI teams perform better when their roles complement each other (Zhang et al., 2022). Furthermore, research indicates that shared mental models (SMMs) are important for HAI teams (Andrews et al., 2023). SMMs are understood as shared understandings of team goals, tasks, and coordination within a team (Denzau & North, 2004). This shared understanding facilitates coordination and collaboration, as team members can anticipate each other's actions, make more accurate predictions, and align their efforts towards shared objectives (DeChurch & Mesmer-Magnus, 2010). Scheutz et al. (2017) suggest that SMMs may be important for the development of effective HAI coordination principles.

Team process literature places a focus on understanding various teaming components that contribute to team effectiveness and performance. These benefits may also be applicable to HAI teams, as AI can contribute to team processes by assisting with information processing and decision-making. However, research is necessary to determine whether HAI teams exhibit team processes, or something else entirely.

Significance of Study:

HAI teaming is an relatively young field of research and highly multidisciplinary in nature. The field is growing rapidly without a cohesive consensus on the impact of varying factors on HAI team

performance. In current research, no review specifically addresses team processes in HAI teaming. HH teaming literature suggests that HAI teams can benefit from team process-related factors, so a systematic review is crucial to gain a better understanding of exactly how team processes can impact performance in HAI teams.

The aim of this review is to identify the presence of team processes in HAI teaming within the literature and highlight the impact of these processes on team performance. This aim will be investigated through the following research questions:

RQ1: What are the team processes in HAI teams?

RQ2: How do team processes affect team performance in HAI teams?

Team processes encompass communication, coordination, decision-making, and collaboration, all of which significantly influence team outcomes. A systematic review can comprehensively analyse a wide range of studies, identify trends, and draw meaningful conclusions from a large body of evidence. Such insights are essential for optimizing team performance, enhancing HAI interaction, and developing effective strategies to address potential challenges in this evolving field. Additionally, the findings from this review can inform the design and implementation of AI systems to better align with human team members, promote adaptability, and ultimately foster successful and harmonious HAI collaborations across diverse domains.

Method

This review was informed by *the Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) framework (Page et al., 2021). All following sections discuss items that are recommended by the PRISMA checklist.

Eligibility Criteria:

Studies were included if they met all of the following criteria.

Outcome of interest: Team Performance

Team performance can be described as the ability of the overall team to complete their given task effectively. This review included studies that specifically identified how HAI teams performed through a measure of team performance. The measure did not strictly need to be quantitative but enabled comparisons between included teams or baseline estimates/presets for what qualifies as a success. Baseline estimates/presets included scores from existing literature, or defined criteria for what is deemed a success in certain tasks, that can be quantified into performance. The measures will likely differ throughout the studies.

Context: Human-AI teams

This review followed the definition of HAI teams from O'Neill et al. (2022).

> HAT can be defined as interdependence in activity and outcomes involving one or more humans and one or more autonomous agents, wherein each human and autonomous agent is recognized as a unique team member occupying a distinct role on the team, and in which the members strive to achieve a common goal as a collective. The "autonomy" aspect of human–autonomy teaming refers to the autonomous agent. (pp. 904–938)

Factors: Team Processes

Team processes are behaviours a team exhibits to allow their team to function more effectively (Marks et al., 2001). To ensure that this review captured relevant studies relating to team processes, the search utilised a combination of synonyms and variations that allow for better literature coverage.

Nature of studies: Primary/Secondary

Included studies conducted primary or secondary data collection and analysis. Also, the studies were of empirical and not theoretical nature.

Language: English

Only English language papers were included.

Publication years: Not Specified

Publication years were not specified, as all HAI teaming studies that incorporated a team process and performance outcome were relevant to this review.

Exclusion Criteria: Sporting Teams

As the search involved synonyms for 'team', it was appropriate to exclude any sports-related teaming studies, as they were beyond the scope of this review.

Search Strategy and Information Sources:

Below is the search strategy that was utilised in the literature search. I consulted with a university librarian, with a Health and Medical Sciences background, for information regarding databases to search, search strings, and search terms.

(("Human-AI Team*") OR ("Human-AI") OR ("Hybrid team") OR ("Human-Agent team*") OR ("Human-Agent Collaboration") OR (Human-Artificial Intelligence) OR ("Human-Autonomy")) AND

(("Team* Processes") OR ("Team Behaviours") OR ("Team Behaviors") OR ("Teaming Behaviours") OR ("Teaming Behaviors") OR (Teamwork) OR (Communication) OR (Collaboration) OR (Teaming) OR (Coordination) OR (Cooperation) OR (Interaction) OR (Monitoring)) AND (("Team Performance") OR (Effectiveness) OR (Functioning) OR (Outcome) OR (Productivity) OR (Quality) OR (Efficiency) OR (Accuracy)

I searched electronic databases to identify studies for this review on the 27th of July 2023. A grey literature search was not conducted due to the time constraints imposed on the review. Table 1 shows the search fields for each database.

Table 1:

The Search Fields of Each Database that was Searched

Database:	**Search Fields:**
Scopus	Subject/Title/Abstract
Proquest	Article title/Abstract/Keywords
Compendex	Abstract/summary text
Pubmed	All fields
Webofscience	All fields
Businesssourceultimate:	Title/Abstract/Subject Terms
Inspec	All fields

Selection Process:

I screened all papers against the eligibility criteria. Studies were screened on their titles and abstracts before the remaining studies screened on their full texts. Six studies were reviewed by my supervisors to ensure consistency in the screening process. Both supervisors, [redacted] and [redacted], reviewed three studies each. Three of these were consistent with my own screening and deemed acceptable for inclusion. Three of the studies had potential for disagreement, though I noticed an error in my screening and corrected it for the reviewed studies. I then screened all studies again, to ensure that the error had been corrected.

Data Collection Process:

The data collection was conducted by me. To ensure consistency, 3 papers were cross-coded by Prof. [redacted]. The coded studies were partially consistent with my coding. To resolve coding issues, I clarified descriptions for chosen team processes, which resulted in coding consistency. To extract data, an Excel coding spreadsheet was created. All studies were examined, and important information was highlighted and inserted into the coding spreadsheet.

Data Items:

Team Processes:

To identify team process codes, I conducted a thematic literature review. I first searched databases on HAI teaming and team processes, with associated terms. I then extracted any process that had a positive impact on team performance. To determine what was considered a team process, I utilised the established eligibility criteria for this review. Some examples of team processes that I extracted in this stage were goal setting, resource allocation, situational awareness, and collaborative task execution. Following this extraction, I categorised each process. These categories were decided upon using the processes that I extracted, along with an understanding of team process groupings in HH teams. I then discussed the strategy with my supervisors and revised my categories into nine team

processes. The description of the team process and how it was measured were also coded in the review. These codes are listed in table 2.

Table 2:

List of Team Process Codes with a Description and Examples.

Team Process	**Description**	**Examples**
Collaboration	How human and AI team members work together to achieve their shared goals.	Joint task execution, complementary skill utilization
Coordination	How team members coordinate themselves to complete their common goal	Coordinated resource/position allocation, shared mental models
Communication	How communication occurs between human and AI team members. This also refers to the continuous communicative relationship between the AI and the human.	Communication channels, and human-guided AI learning.
Information Exchange	How information is transmitted between AI and Humans.	AI-generated insights shared with humans, real-time feedback loops, AI-generated feedback to guide human decisions

Transparency	How transparent AI systems are. This involves whether AI systems can justify their decisions. This also includes whether AI provides levels of confidence for their success.	AI reasoning explanations, understandable AI-generated outputs, transparency in resource allocation.
Shared Decision-Making:	How human and AI team members collectively contribute to making decisions. Similar to Collaboration, but focus is on the decision-making process rather than the task itself. So, Shared Decision Making is more associated with making informed decisions.	Joint decision-making processes, integrating AI insights into human decisions, situational awareness
Trust-Building	The development of trust between human and AI team members	Human trust in AI reasoning, perceived AI system reliability, ethical considerations.
Adaptation	How the team adapts to differences or complications that arise. Can involve how team members adapt to AI or how AI adapts to humans.	Adaptive decision-making, responsive strategy adjustments.
Flexibility	How a team is prepared to adapt to change when it is presented. This is	Adaptation training

	distinguished from adaptation as it directly involves what prefaces teaming. Note, that there will be an intersection with adaptation, but adaptation training may not constitute observed adaptation.	

Team Performance:

The codes for performance outcomes were discussed. I decided that an understanding of the performance impacts and contextual information was important. The codes are presented in Table 3.

Table 3:

Team Performance Codes and Descriptions.

Code	**Description**
Actual Team performance	What the actual observed performance of the team is.
Performance measurement	How performance is measured.
Performance enhancement	How team performance is enhanced.
Performance challenges	What the challenges that impeded team performance are if specified
Performance implications	What are the implications of the performance outcome is.

Contextual Information:

Contextual information was also coded. A summary of these codes is presented in Table 4. The type of AI/Task and HAI team size/composition were recorded to ensure a fair comparison between studies was conducted, as they may provide important context to the results of studies (O'Neill et al., 2022). The method of analysis section was recorded for easier access to information for risk of bias assessment.

Table 4:

Study Characteristics and Information.

Code	**Description**
Administrative Details	
Authors	Authors
Year	Year published.
Reference	Reference
Journal name	Journal name
Background	Researcher Background
Study Information	
Research aims	Aims of study
Research questions/hypotheses	Research questions/hypotheses
Sample size	Sample size

Sample inclusion/exclusions	Specific inclusion/exclusions of the sample
Type of task utilised	What type of task does the study use? Categories for this section will be created.
Type of AI utilised	What type of AI does the study use? Categories for this section will be created.
HAI team size	HAI team size
HAI team composition	Number of humans and AI in the team.
Results/Conclusions	
Results as reported by the author	Results of the study in the author's words.
Conclusions as reported by the author	Conclusions of the study in the author's words
Moderating factors	Any factors that may have moderated the relationship
Implications of the study	Implications of the study
Method of Data Analysis	
Rationale for Analysis Method	The analysis method utilised
Analysis Method	What analysis method was utilised?
Confounding Variables	Potential confounding variables accounted for
Description of validity, trustworthiness of analysis	The description of validity/trustworthiness.

Risk of Bias*:*

The Mixed Methods Appraisal Tool (MMAT) was utilised to assess the risk of bias in each of the reported studies. Risk of bias refers to the potential for systematic errors or inaccuracies in research studies that can introduce deviations from true results (Higgins et al., 2011). Risk of bias assessment is crucial to ensure the reliability and validity of research findings, as it enables the identification of factors that may undermine data quality. The MMAT is a research tool for evaluating risk of bias in qualitative, quantitative, and mixed-methods research (Hong et al., 2018). All 20 papers were examined with the MMAT. A discussion of the MMAT results can be found in the results.

Synthesis Methods:

Data was separated within a coding Excel sheet based on their application to different team processes and performance outcomes. This involved grouping study results by the type of team process they investigated and how that team process impacted team performance. The conclusions on performance impact were taken directly from the studies' conclusions. Some studies identified multiple team processes and performance outcomes, so they appear in multiple groups. Furthermore, groupings of task types were also identified for comparison. The groupings were examined to determine if there was an overall positive effect of the team process on performance from the reviews. Team processes were grouped and the performance outcome from the study was compared within the coding spreadsheet. This method of synthesis was chosen since this review's main concern was to identify if team processes were present, and what their effect on performance was. This review was not necessarily concerned with the amount of performance increase that each team process had on performance or comparing the quantitative data. The choice of this method was helped by the fact that the included studies all utilised similar quantitative measures of performance through the scoring of teams on defined metrics.

Results

This section will summarise the findings of the literature search conducted using the previously defined method. The results of the coding process are also discussed, with key information presented. The findings of the review are set out in preparation for the discussion.

Results of Search and Selection Process:

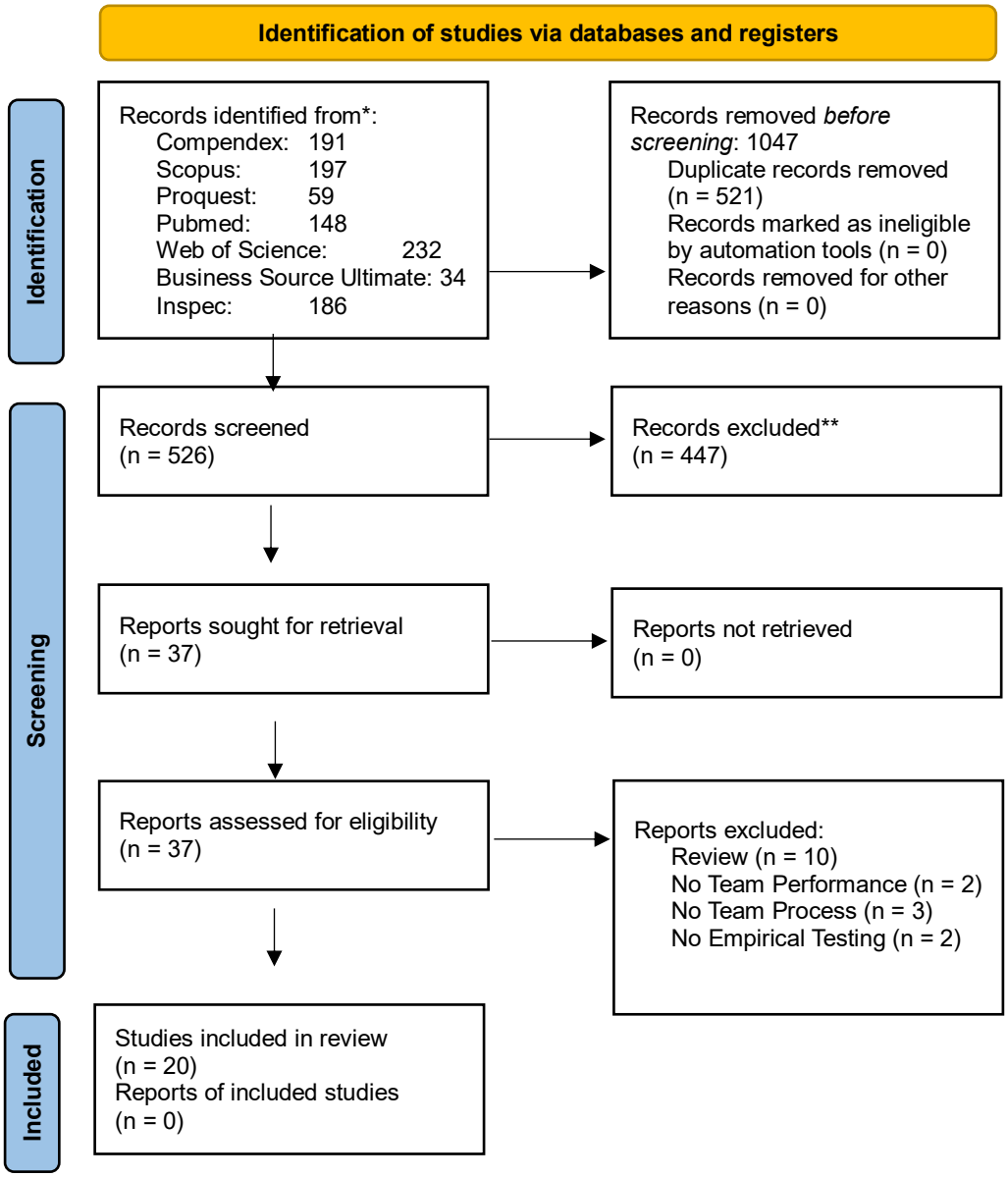
The search and selection process results are summarised in Figure 1. Studies were first screened on the abstract. Studies that presented a relevant abstract screened on their full text, where their eligibility could be assessed in its entirety.

Risk of Bias:

A summary of the MMAT assessments is contained in Table A1, where each of up to five domains of bias are assessed. (Hong et al., 2018). In terms of overall risk of bias, there were risk of bias concerns in all 20 papers, with 18 having a low risk and 2 having a moderate risk. All papers were judged to have a sufficiently low risk of bias to be included in this review.

Figure 1:

Prisma Flow Diagram of Selection Process for Studies Included in Systematic Review.



Study Characteristics:

Here I include a table examining the study characteristics of the chosen studies. The table presents the sample size, team size, team composition, type of task, and type of AI. The team composition refers to how many AI and human team members completed the assigned tasks.

Table 5:

Table of Study Characteristics.

Study	**Sample Size**	**Team Size**	**Team Composition**	**Type of Task**	**Type of AI**
Bennett et al. (2023)	138 - HH - 296 - HM	2	1 Human, 1 AI	Collaborative Game	Reinforced Learning Agent
Bogg et al. (2021)	24 humans, 1 AI with varying conditions	7	6 human, 1 AI	Collaborative Game	Communicative AI
Demir et al. (2023)	60	16	1 Robot, 15 Human	Urban Search and Rescue (USAR)	Wizard of Oz

Demir et al. (2019a)	70	3	2 human, 1 AI	Simulated Reconnaissance	ACT-R based cognitive model
Demir et al. (2017)	70	3	2 human, 1 AI	Simulated Reconnaissance	ACT-R based cognitive model
Demir et al. (2019b)	70	3	2 human, 1 AI	Simulated Reconnaissance	ACT-R based cognitive model
Ezenyilimba et al. (2023)	48	12	1 AI, 11 h	Simulated Reconnaissance	Military Recon
Hanna & Richards. (2018)	First Study: 66, Second Study: 20	2	1 Human, 1 AI	Collaborative Game	Communicative AI
Johnson et al. (2021)	60	11	1 AI, 10 H	Simulated Reconnaissance	Wizard of Oz
Karten et al. (2023)	106	2	1 Human, 1 AI	Collaborative Game	Communicative AI

Li et al. (2021)	First Experiment: 104, Second Experiment: 134	2	1 Human, 1 AI	Collaborative Game	Reinforced Learning Agent
McNeese et al. (2021a)	44	3	2 human, 1 AI	Collaborative Game	Military Recon
McNeese et al. (2021b)	60	3	Both 1H 2AI and 2H 1AI	Collaborative Game	Reinforced Learning Agent
Nakahashi et al. (2021)	100	2	1 Human, 1 AI	Collaborative Game	Guiding Agent - 3 conditions
Ruikun Luo et al. (2019)	34	2	1 Human, 1 AI	Collaborative Game	Intelligent Assistant
Schadd et al. (2022)	44	2	1 Human, 1 AI	USAR and Blanket Search	Military Recon
Schelble et al. (2022)	80	3	2 human, 1 AI	Collaborative Game	Wizard of Oz

Schoonderwoerd et al. (2022)	35	2	1 Human, 1 AI	USAR	Wizard of Oz
Silva et al. (2023)	340	2	1 Human, 1 AI	Situational Judgement	Wizard of Oz
Vossing et al. (2022)	2	2	1 Human, 1 AI	Future Planning	Transparent AI

Results of Individual Studies:

Table 6 displays the performance impact of each coded team process in the studies and highlights noteworthy moderators outside of team size and composition.

Table 6:

Performance Impact of Each Team Process Present in Studies.

Study	**Team Process**	**Performance Outcome**	**Moderating Factors**

Bennett et al. (2023)	Collaboration	No Impact	Human Bias
Bogg et al. (2021)	Communication	Increased	Trust
	Transparency	Increased	
	Shared Decision Making	No impact	
Demir et al. (2023)	Coordination	Mixed	Dynamic task context, trust
	Transparency	Increased	
	Communication	Increased	
Demir et al. (2019)	Coordination	Linked	Dynamic task context
	Communication	Linked	
Demir et al. (2017)	Communication	Linked	Dynamic task context
	Coordination	Linked	

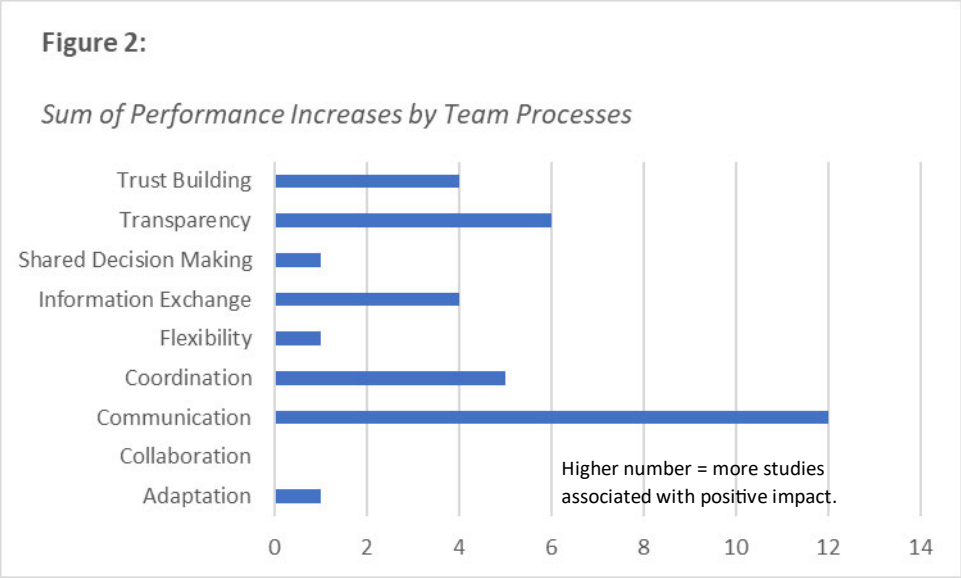
Demir et al. (2019)	Communication	Linked	Team Situational Awareness
	Coordination	Linked	
Ezenyilimba et al. (2023)	Transparency	Increased	Dynamic task context
	Communication	Increased	
Hanna & Richards. (2018)	Communication	Increased	Trust and SMMs
	Trust Building	Increased	
	Coordination	Increased	
	Information Exchange	Increased	
Johnson et al. (2021)	Communication	No impact	
	Coordination	No impact	
Karten et al. (2023)	Communication	Increased	Temporal Aspects

	Information Exchange	Increased	
Li et al. (2021)	Adaptation	Increased	Diversity of adaption policy library
	Flexibility	Increased	
McNeese et al. (2021a)	Trust Building	Increased	Team communication and coordination
McNeese et al. (2021b)	Coordination	Mixed	Lack of AI communication
Nakahashi et al. (2021)	Information Exchange	Increased	Communication with Agent and team coordination
	Shared Decision Making	Increased	
Ruikun Luo et al. (2019)	Transparency	Increased	Trust
	Communication	Increased	
	Trust Building	Increased	
	Information Exchange	Increased	

Schadd et al. (2022)	Transparency	No Impact	Dynamic task context
	Communication	No Impact	
Schelble et al. (2022)	Trust Building	No Impact	Homogeneity of sample size
Schoonderwoerd et al. (2022)	Adaptation	No Impact	Study Design, effective communication, trust
Silva et al. (2023)	Transparency	Increased	Trust
	Communication	Increased	
	Trust Building	Increased	
Vossing et al. (2022)	Transparency	Increased	Trust
	Communication	Increased	

Summary of Team Process Impact on Performance:

Figure 2 displays impact of team processes on performance overall. The total number of codes for individual team processes is used to calculate the association.



Team Processes and Performance in HAI Teams

The total number of team processes was more than double (*n* = 42) the number of included studies. Each of the team processes will be discussed further in following sections. Positive performance outcomes were identified for over 75% of the included studies (*n* = 32), while only one study displayed a negative relationship with performance. Some studies (*n* = 10) found no significant impact on performance or mixed results.

Collaboration

Collaboration was only specifically measured in one study, Bennet et al. (2023). The study found that HAI teams did not significantly benefit from collaborative teamwork in comparison with competitive teamwork. Therefore, there was no substantial impact on team performance associated with collaboration. Notably, the agent lacked many useful skills that could promote other team processes, such as communication.

Communication:

Communication was present in over half (*n* = 13) studies. Two, Shaad et al. (2022) and Johnson et al. (2021) found no significant effect of communication on performance. The studies identified that communication had benefits for team coordination, despite no direct team performance increase.

Three studies identified a linked performance outcome, Demir et al. (2017), Demir et al. (2019a), and Demir et al. (2019b). The three studies highlighted that team communication was poor in HAI teams when compared with HH teams. The main factors that influenced communication were AI rigidness and adaptation, causing a communication disconnect with human teammates. Therefore, they all concluded that communication is important to performance in HAI teams, provided it is delivered in a sophisticated manner.

The remaining 8 studies all found a direct performance increase when communication was utilised. Demir et al. (2023) found that team communication recurrence was highly related to team performance, as it improved the understanding of the human operator. Karten et al. (2023), Bogg et al. (2021), Vossing et al. (2022), and Silva et al. (2023) found that the type of communication implemented was important for team performance. Communication type was varied by text/audio in Bogg et al. (2021), and level of explainability in Silva et al. (2023). and Vossing et al. (2022), while Karten et al. (2023) developed prototype communication to better simulate human communication. Both Karten et al. (2023) and Demir et al (2023) also highlighted the significance of communication frequency, where too much communication can be detrimental to team performance. Hanna & Richards. (2018) found that increasing team communication allowed for better human commitment, leading to performance benefits. This association had strong links with other team processes. Similarly, Ruikun et al. (2019) and Ezenyilimba et al. (2023) found that communication fostered better trust, which promoted better team performance.

Information Exchange:

All five studies that coded for information exchange identified increases in performance. Hanna & Richards. (2018) and Karten et al. (2023) identify multiple aspects of communication, including operator feedback, are important to team performance. Karten et al. (2023) specifically highlight the role of prototype communication, which involves a testing process to refine better communication strategies. Both Nakahashi & Yamada (2021) and Ruikun et al. (2019) specify the role of AI-generated feedback to help guide humans towards the best option. Nakahashi & Yamada (2021) found that both measured forms of guidance that were implemented created the best team outcomes. Ruiken et al. (2019) found an important relationship between information exchange, trust, and transparency, with correct guidance more likely to be accepted when the agent was more transparent.

Transparency:

Bogg et al. (2021) was the only study that reported non-significant results in the implementation of AI transparency. The study found no substantial effect on team performance associated with AI transparency. Conversely, Demir et al. (2023) found that their explainable AI condition produced the most repeated communications which aided in team performance. Ezenyilimba et al. (2023) identified that the most transparent AI conditions produced the highest team performance. Interestingly, the study found no substantial difference between the medium and low transparency conditions. Ruikun et al. (2019) found that the presence of an Option-Centric display that communicated reasons and explanations for decisions benefited team performance. Similarly, Silva et al. (2023) recognised human perception of explainability as crucial for better team performance outcomes. Finally, Vossing et al. (2022) signified the importance of transparency for expert decision-making. Experts were capable of utilising their domain expertise more effectively when the AI was transparent.

Coordination:

Team coordination provided the most mixed results for performance. Demir et al. (2023) found that team coordination dynamics produced positive, negative, and no impact on performance. Similarly, McNeese et al. (2021b) identified HAI teams as higher performing than HH teams, despite lower levels of team interaction and perceived team cognition. However, the study also identified that levels of team cognition were not low in HAI teams, sitting in a moderate range. Team cognition refers to the shared understanding of the tasks, positions, and knowledge that exists between team members. Demir et al. (2017), Demir et al. (2019a), and Demir et al. (2019b) all found a link between team coordination and performance. The studies posited that HAI team coordination dynamics were rigid, not adaptive, and underdeveloped, leading to poor performance outcomes. Similarly, Hanna & Richards. (2018) found that SMMs were associated with higher levels of human commitment which promoted better team performance. Johnson et al. (2021) identified that team coordination could be increased in HAI teams through coordination training, however, there was no observable performance benefit.

Trust-Building:

Scheible et al. (2022) identified no significant impact of trust-building on performance. When AI agents engaged in ethical violations, team trust decreased and team performance remained the same. Hanna & Richards. (2018) found that trust played a role in the development of human commitment, and relationships with other team processes, which created higher team performance. McNeese et al. (2021a) identified that trust was highest at the beginning of trials, and it evolved over time irrespective of performance. High-performing HAI teams did not exhibit trust issues with the AI agent or other human team members, which were present in medium and low-performing teams. The study also identified that the relationship between trust and performance is not fully understood, and could be bidirectional. Both Ruiken et al. (2019) and Silva et al. (2023) signified that AI transparency was crucial to trust-building, which provided better team performance outcomes.

Shared Decision Making:

Bogg et al. (2021) identified that situational awareness did not correlate with an increase in performance. Conversely, Nakahashi & Yamada (2021) specified that provding recommendations, where humans could make the final decision, increased performance and enabled humans to fell more autonomous.

Flexibility and Adaptation:

Li et al. (2021) constructed an agent that underwent adaptation training to become more flexible. The agent was capable of changing its method for proceeding with the task based on the human teammates' method. The adaptive agent teams performed better than when the agent would randomly select its method of reaction. Furthermore, teams performed best when mutual adaptation between both the agent and the human occurred. Schoonderwoerd et al. (2022) found that operator adaptability provided increased learning and understanding of the AI. Despite this, the study found no significant impact of adaptation on performance.

Study Characteristics and Performance:

The following sections will discuss attributes of the studies that may have impacts on all team processes or performance outcomes

Task and AI Type:

Task type was relatively similar across studies, fitting into five categories. Performance outcomes by task type produced mixed results. Most task types did not produce any significant differences across studies, with positive performance outcomes observed in over 75% of studies of each type. However, Urban Search and Rescue (USAR) tasks produced the most divergent results, with half of the processes finding not significant or mixed results. Importantly, many of the USAR task studies cited dynamic task content as a moderating factor for their results.

The type of AI was categorised into six groups. The studies that incorporated five out of the six AI types saw performance results of 70% or higher, while those that utilised Reinforced Learning Agents only saw one of three studies produce positive team performance.

HAI Team Size and Composition:

Neither HAI team size nor Team composition had a noticeable influence on the team process that was measured, nor the performance outcome in the studies. A finding from McNeese et al. (2021b) also identified that team composition had a negligible effect on team performance.

Discussion

Addressing the Research Questions

HAI teaming is an ever-growing field of research. The aim of this systematic review was to identify team processes in HAI teaming, and how they impact team performance.

The first research question asked if team processes were present in HAI teams. All included studies were included based on the presence of a team process. Furthermore, all included studies were coded for at least one defined team process. Therefore, team processes are present in HAI teams.

The second research question asked if team processes benefited team performance outcomes in HAI teaming. Team process had an overall beneficial performance outcome on HAI teaming. While not all coded team processes produced overwhelmingly positive results, there was no presence of team processes having a significantly negative impact on HAI teaming. The positive performance outcomes were similar to those presented in HH teaming (Mathieu et al., 2008).

Team Performance in HAI Teams

One detail that emerged from this systematic review is the interdependence of team processes in HAI teams. Team communication existed in nearly all studies, even when the performance outcome of was not measured. Communication, through transparency, was highly related to trust across the literature, a finding that is consistent with previous studies (Glikson & Woolley, 2020). HAI teams that displayed low performance subsequently displayed rigid communication and underdeveloped coordination strategies (Demir et al., 2017; Demir et al. 2019a). Team coordination may rely on effective communication, as humans largely rely on communication to coordinate themselves (DeChurch & Mesmer-Magnus, 2010; Rico et al., 2008). This is displayed in the only study that did not incorporate a method of team communication. The study identified that a lack of communication may have forced human team members to coordinate differently than they were accustomed to, generating mixed performance results (McNeese et al., 2021b). Therefore, team communication appears pivotal to the generation of team coordination in HAI teams. One study proposed

coordination training as a method for increasing performance. While no performance impact was identified, the study found that conducting the training increased overall team communication (Johnson et al., 2021). Interestingly, the study explained that the communication change was not adaptive or flexible, which may have contributed to the performance outcome, since adaptation also displayed links with communication and coordination. Importantly, in a study where team communication was high, team coordination in the form of SMMs was also high (Hanna & Richards, 2018). Since this was the only case of a direct performance benefit associated with coordination, it suggests that communication and coordination have a significant interdependent relationship. These findings are consistent with HH teaming literature, where team processes are highly interdependent (LePine et al., 2008; Mathieu et al., 2008).

Individually, team communication emerged as the most prevalent contributor to team performance outcomes. Team communication is sharing information within a team (Marks et al., 2001). Communication rigidity was identified as a key factor in poorly performing HAI teams, with prolonged unchanging communication proving detrimental (Demir et al., 2017; Demir et al. 2019a; Demir et al., 2019b; Demir et al., 2023). Text-based communication was predominantly utilised in studies, which can introduce an emotional disconnect in humans, and negatively impact relationships (Wood, 2015). HAI teams, audio-based communication led to better performance outcomes than text-based communication (Bogg et al., 2021). This finding may be related to the method of communication humans usually partake in. Humans mainly engage in a combination of verbal and non-verbal communication, using speech and body language (Mast, 2007). Text-based communication may lack the nuances and spontaneity found in conventional human interaction, creating a robotic or formulaic responses that could contribute to the perceptions of AI rigidity. Text-based communication can be improved by implementing strategies, such as prototype-based communication. Prototype-based communication refers to a method of providing clear communication patterns that both humans and AIs can use to interact effectively (Karten et al., 2023). This communication style may allow the circumvention of rigidity associated with AI

communication by promoting a more adaptive and collaborative communication method. Adaptive communication is also pivotal in HH teams, may help prevent rigidity in HAI teams by avoiding formulaic or generic communication (Entin, 2003). Furthermore, the accuracy of communication may also be critical for performance. Regarding AI guidance, human teammates are more likely to accept the information if it is likely to be correct (Ruiken et al., 2019). Therefore, it is critical to maintain a high degree of AI capability, so that humans maintain a high level of trust and recommendation acceptance, which will generate higher performance. This finding is consistent with HAI teaming literature, where AI performance and trust have a two-way relationship (Glikson & Woolley, 2020; Hancock, 2011). Communication frequency was also identified as a significant feature, whereby an overabundance of team communication was detrimental to team performance. Too much communication can cause information overload and distract team members from their tasks, leading to poorer performance (Barrett et al., 2021; Nordin & Muhalis, 2019). Ensuring AI has the capacity to adjust performance output to suit human teammates may lead to better team performance.

Transparent communication created significantly higher team performance in HAI teams (Silva et al., 2023; Vossing et al., 2022). AI explanations provide a rationale for decisions, which can foster higher trust in AI abilities. AI explanations may allow experts to utilise their domain expertise to determine if the recommendation is reasonable to accept (Vossing et al., 2022). In this case, transparency creates performance benefits by promoting the strengths of other team members. Notably, HAI team performance benefits are witnessed when AIs are perceived as transparent (Silva et al., 2023). Therefore, AI that can convince humans of its transparency need not necessarily be truthful to obtain positive HAI performance outcomes. This posits the consideration of future ethical problems that may arise from untruthful AI. One study identified that ethical trust violations did not impact team performance, despite decreasing trust, which signifies that trust in AI systems may be separated into task-based and ethics-based trust (Scheible et al., 2022). If this is the case, then it may be possible to garner positive team performance outcomes in cases of ethical mistrust. Trust in AI systems is temperamental without including ethics, with trust declining over the course of an experiment

(McNeese et al., 2021a). So, the inclusion of ethical considerations in HAI may force researchers to consider a new facet of trust calibration that could have significant performance considerations.

The role of adaptation and flexibility may be understated in the results of this review. Many studies identified the lack of adaptable AI as detrimental to performance outcomes. However, only a few studies directly addressed adaptability or flexibility. The most significant finding was that AI adaptation produced the most beneficial HAI performance outcomes when all team members were involved. Crucially, this finding may tie into the interdependent association between adaptability and other team processes, such as communication and coordination. In empirical studies, human participants will likely be working with AI systems with limited training. Thus, having the capacity to adapt to the AI's communication or coordination strategies during the task may be crucial to creating better performance outcomes.

Limitations:

This review was subject to some limitations. Firstly, task types were relatively uniform across studies, with the majority of studies sorted into three groups. Therefore, the performance outcomes that were identified may not be generalisable to diverse domains. Similarly, the empirical nature of the studies may limit the applicability of results to long-term teams. All included studies conducted experiments on short-term teams, where HAI teams had limited time to work together. Teams are shown to become more effective when they spend more time together (Mathieu et al., 2008). This may be more significant to HAI teams, as human participants must also gain an understanding of teaming with AI systems. In the practical use of HAI teaming, human team members will have more time to learn how to communicate and coordinate with the AI, which will presumably lead to a better understanding of the workings and better performance outcomes. Thus, the limited diversity in time spent in a team limits the practical applicability of this review's findings. Furthermore, many of the included studies utilised advanced and sophisticated AI systems. These systems are not easily accessible outside of research domains, so the performance outcomes may vary when using

consumer-level AI. Also, due to the popularity of HAI research, it is highly possible that studies have been published in the time that it has taken to write this review. Therefore, it is worth noting the literature search was conducted in July 2023, annd studies published after that date are not included.

Practical Implications:

Organisations that seek to integrate AI into their operations stand to benefit from this review. Organisations should incorporate team processes into future and current HAI teams. This provides an opportunity for selective investment into specific areas that will see performance gain. It would be reasonable to focus on the incorporation of team processes that may facilitate or promote the development of other processes. Therefore, team communication should be a focus for organisations, as it produces the most substantial performance benefits, while also promoting trust and coordination. To gain the best performance outcomes, organisations must engage in the construction or acquisition of sophisticated AIs that can benefit from team processes. This may require consultation with HAI teaming researchers. Notably, this review has significant practical limitations, due to the included studies being empirical in nature. Team processes may be crucial for short-term teaming in empirical studies. Processes like adaptation and transparency may play pivotal roles in the early stages of HAI teaming, through the development of trust and team cohesion. However, the effects of these processes may diminish after the initial stages of teaming, and future research is necessary to determine the lasting effects in long-term HAI teams. Therefore, the identified performance benefits from team processes may not yet be achievable for organisations that seek to employ long-term HAI teams.

Theoretical Implications:

The findings of this review provide contributions to the field of HAI teaming by specifying team processes that have performance benefits. Firstly, the application of team processes to HAI teaming displays that HH team dynamics are applicable to HAI contexts. Therefore, research in HAI should continue to implement HH teaming strategies and theories into HAI teams, to refine improvements

in performance. The results of communication in this study signify its role in the development of team cooperation, trust, and performance. Perhaps communication acts as a facilitator that constitutes the performance benefits of other team processes, as it does in HH teams (Schaefer et al., 2016). Furthermore, since communication fosters trust, and trust appears to have a bidirectional relationship with performance, greater team trust may signify a higher willingness to engage in communication. Future research should continue unpacking the role of communication in HAI teaming, with a specific emphasis on whether other team processes can benefit team performance without communication. Ethical violations should also be further considered moving forward. HAI teams may still benefit from high performance while exhibiting low levels of ethical trust. Researchers may wish to further explore ethical violations, whereby trust calibration should focus on both task-based and ethics-based trust. Finally, research should continue to explore the role of humans in HAI teaming. Many HAI team processes place an emphasis on the AI team member. If the goal of HAI teaming is a true collaboration, then team processes should actively consider how humans interact with AI systems to promote the best outcomes for the team.

Conclusion

In this review, HAI teaming is examined through team processes. Firstly, this review confirms the existence of team processes in HAI teams. These processes encompass a range of elements present in team process literature, including communication, coordination, shared decision-making, and trust calibration. Crucially, the results indicate that team processes exhibit an overall positive relationship with team performance in HAI teams. Team communication emerges as a cornerstone of trust and coordination facilitation while contributing to significant team performance benefits. Communication transparency, adaptability, accuracy, frequency, and style have all been identified as key facets of team communication, each providing different reasons for positive performance outcomes. In summary, this systematic review serves to guide further research into the dynamics of HAI teaming. Team processes appear pivotal to HAI teaming, and future research should continue to examine the blooming relationships identified in this review.

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Appendix:

Table A 1:

Results of Risk of Bias Assessment (MMAT).

Randomised Control						
Study	**Randomisation Performance**	**Group Comparability at Baseline**	**Complete Outcome data**	**N/A**	**N/A**	**Risk**
Bogg et al. (2021)	Low risk – sufficient discussion of randomisation	Low risk – group similarities discussed	Low risk – sufficiently addressed	N/A	N/A	Low
Schoonderwoerd et al. (2022)	Low risk – sufficient discussion of randomisation	Moderate risk – limited discussion about group comparability	Low risk – sufficiently addressed	N/A	N/A	Moderate
Non-Randomised						
Study	**Representative of Target Population**	**Appropriate Measurement**	**Complete Outcome data**	**Counfounders accounter for**	**Process assigned as intended**	**Risk**

Bennet et al. (2023)	Moderate Risk – minimum explanation of sample	Low risk – Measurement appropriate	Low risk – sufficiently addressed	High risk – no mention of confounders	Low risk - implemented as intended	Moderate
Demir et al. (2019)	Low risk – adequate sample discussion	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Moderate risk – limited discussion of confounders	Low risk - implemented as intended	Low
Demir et al. (2023)	Low risk – adequate sample discussion	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Moderate risk – limited discussion of confounders	Low risk - implemented as intended	Low
Demir et al. (2019)	Low risk – adequate sample discussion	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Moderate risk – no discussion of confounders, but statistical analyses used to minimise impacts	Low risk - implemented as intended	Low
Demir et al. (2017)	Low risk – adequate	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Moderate risk– limited	Low risk - implemented as intended	Low

	sample discussion			discussion of confounders		
Ezenyilimba et al. (2023)	High risk – inadequate description of sample	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Moderate risk – limited discussion of confounders	Low risk - implemented as intended	Low
Hanna et al. (2018)	Low risk – adequate sample discussion	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Low risk – confounding variables discussed and accounted for	Low risk - implemented as intended	Low
Johnson et al. (2021)	Low risk – adequate sample discussion	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Moderate risk – variables discussed but not fully accounted for	Low risk - implemented as intended	Low
Karten et al. (2023)	Moderate risk – limited explanation	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Moderate risk – limited discussion of confounders	Low risk - implemented as intended	Low
Li et al. (2021)	Moderate risk – limited explanation	Low risk – Measurement appropriate	Low risk – sufficiently addressed	High risk – confounding variables	Low risk - implemented as intended	Low

				present and not discussed		
McNeese et al. (2021)	Low risk – adequate sample discussion	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Low risk – most confounders controlled	Low risk - implemented as intended	Low
McNeese et al. (2021)	Low risk – adequate sample discussion	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Low risk – most confounders controlled	Low risk - implemented as intended	Low
Nakahashi et al. (2021)	Moderate risk – limited explanation	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Moderate risk – addressed but limited	Low risk - implemented as intended	Low
Ruikun et al. (2019)	Moderate risk – limited explanation	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Low risk – most confounders controlled	Low risk - implemented as intended	Low
Schadd et al. (2022)	Moderate risk – limited explanation	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Low risk – confounders addressed	Low risk - implemented as intended	Low
Schelble et al. (2022)	Moderate risk – limited explanation	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Low risk – confounders addressed	Low risk - implemented as intended	Low

Silva et al. (2023)	Moderate risk – limited explanation	Low risk – Measurement appropriate	Low risk – sufficiently addressed	Moderate risk – limited discussion	Low risk - implemented as intended	Low
Mixed Methods						
Study	**Rationale**	**Effectiveness of both components**	**Quality of Interpretations**	**Address Divergencies**	**Adherence to Qualitative and Qualitatieve Sections**	**Risk**
Vossing et al. (2022)	Low risk – adequate rationale	Low risk – both components necessary	Low risk – Results interpreted well	Moderate risk – limited	Low – Good adherence to both	Low

Table A 2:

Team Processes Impact on Performance with Grouped Team Processes and Study Characteristics.

Study	**Team Process**	**Impact on Performance**	**HAI Team Size**	**HAI Team Composition**
Bennett et al. (2023)	Collaboration	No Impact	2	1 Human, 1 AI

Bogg et al. (2021)	Communication	Increased	7	6 human, 1 AI
Demir et al. (2023)	Communication	Increased	16	1 AI, 15 Human
Demir et al. (2019a)	Communication	Linked	3	2 humans, 1 AI
Demir et al. (2017)	Communication	Linked	3	2 humans, 1 AI
Demir et al. (2019b)	Communication	Linked	3	2 human, 1 AI
Ezenyilimba et al. (2023)	Communication	Increased	12	1 AI, 11 h
Hanna & Richards. (2018)	Communication	Increased	2	1 Human, 1 AI
Johnson et al. (2021)	Communication	No impact	11	1 AI, 10 H
Karten et al. (2023)	Communication	Increased	2	1 Human, 1 AI
Ruikun Luo et al. (2019)	Communication	Increased	2	1 Human, 1 AI
Schadd et al. (2022)	Communication	No Impact	2	1 Human, 1 AI
Silva et al. (2023)	Communication	Increased	2	1 Human, 1 AI
Vossing et al. (2022)	Communication	Increased	2	1 Human, 1 AI
Demir et al. (2023)	Coordination	Mixed	16	1 AI, 15 Human
Demir et al. (2019a)	Coordination	Linked	3	2 human, 1 AI
Demir et al. (2017)	Coordination	Linked	3	2 human, 1 AI
Demir et al. (2019b)	Coordination	Linked	3	2 human, 1 AI

Hanna & Richards. (2018)	Coordination	Increased	2	1 Human, 1 AI
Johnson et al. (2021)	Coordination	No impact	11	1 AI, 10 H
McNeese et al. (2021b)	Coordination	Mixed	3	Both 1H 2AI and 2H 1AI
Li et al. (2021)	Flexibility	Increased	2	1 Human, 1 AI
Li et al. (2021)	Adaptation	Increased	2	1 Human, 1 AI
Schoonderwoerd et al. (2022)	Adaptation	No Impact	2	1 Human, 1 AI
Hanna & Richards. (2018)	Information Exchange	Increased	2	1 Human, 1 AI
Johnson et al. (2021)	Information Exchange	Increased	11	1 AI, 10 H
Nakahashi et al. (2021)	Information Exchange	Increased	2	1 Human, 1 AI
Ruikun Luo et al. (2019)	Information Exchange	Increased	2	1 Human, 1 AI
Bogg et al. (2021)	Shared Decision Making	No impact	7	6 human, 1 AI
Nakahashi et al. (2021)	Shared Decision Making	Increased	2	1 Human, 1 AI
Bogg et al. (2021)	Transparency	Increased	7	6 human, 1 AI
Demir et al. (2023)	Transparency	Increased	3	1 Robot, 15 Human
Ezenyilimba et al. (2023)	Transparency	Increased	12	1 AI, 11 h
Ruikun Luo et al. (2019)	Transparency	Increased	2	1 Human, 1 AI

Schadd et al. (2022)	Transparency	No Impact	2	1 Human, 1 AI
Silva et al. (2023)	Transparency	Increased	2	1 Human, 1 AI
Vossing et al. (2022)	Transparency	Increased	2	1 Human, 1 AI
Hanna & Richards. (2018)	Trust Building	Increased	2	1 Human, 1 AI
McNeese et al. (2021a)	Trust Building	Increased	3	2 human, 1 AI
Ruikun Luo et al. (2019)	Trust Building	Increased	2	1 Human, 1 AI
Schelble et al. (2022)	Trust Building	No Impact	3	2 human, 1 AI
Silva et al. (2023)	Trust Building	Increased	2	1 Human, 1 AI