INPLASY

Stress in Human-Robot Interaction in an Industrial Context: a systematic review

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ADMINISTRATIVE INFORMATION

Support - N/A.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 13 January 2025 and was last updated on 13 January 2025.

INTRODUCTION

*R*eview question / Objective To improve Human-Robot Interaction, it is necessary not only to develop the intelligence and physical abilities of robots but also to find a way to evaluate the stress experienced by people in this interaction (Pollak et al., 2020), which has received little scientific attention to date. The present systematic review was designed to determine the factors and consequences of stress in human-robot interaction in an industrial context.

Rationale Sharing the same workspace and working with robots can cause high levels of performance pressure on workers, increasing the cognitive load of tasks and significantly impacting mental health (EU-OSHA, 2019). Therefore, human-robot interaction must be physically safe and psychologically comfortable for workers (Ferreira, 2021), and it can significantly impact their stress levels. In the present study, we intend to increase knowledge and systematise research in the area of stress through the evaluation of the factors and consequences of stress in human-robot interaction.

Condition being studied The present systematic review aims to determine the factors and consequences of stress in human-robot interaction in an industrial context.

METHODS

Search strategy Three electronic databases (Web of Sciences, Scopus and EBSCOhost) will be used in the search, using the following search terms: (Industr* OR automat* OR Manufact* OR Factor* OR Lab* OR Producti*) AND (Stress* OR Distress OR "Job Stress" OR "Work-related Stress" OR "Workplace Stress") AND ("Human Robot Interact*" OR "Human Robot Interac*" OR HRI OR "Human-interact*" OR "Human-interact Robot*" OR Robot* OR Cobot OR Cobotic OR Co-robotic OR "Collaborative robot" OR "Collaborative human-robot" OR "industrial robots" OR "Industrial Robotics" OR Anthropo* OR "Artificial intelligence" OR "Virtual reality") AND ("Factors and

consequences of stress" OR "Causes of stress" OR "Perceived security" OR Security OR Predict* OR "User experience" OR Experience* OR "Sense of control" OR Control* OR Usability OR "Task involvement" OR "Physical characteristics of the robot" OR "Emotional distress" OR "Negative emotions" OR Worry* OR Distress OR Tensi* OR Pressure OR Anxiety OR Nervousness OR Depression OR Discomfort* OR Trust OR Burnout OR "Cognitive Overload" OR "Work overload" OR "Well-being" OR "Mental health").

Participant or population This review will include studies with participants working in an industrial context.

Intervention The present systematic review has been designed primarily to analyse the impact of stress on human-robot interaction.

Comparator N/A.

Study designs to be included The research will include quantitative empirical studies.

Eligibility criteria The research will include quantitative empirical studies on stress and human-robot interaction, written in English and published in specialised journals. Grey literature and all studies that are unrelated to the topic in question will be excluded from the study. Articles written in a language other than English will also be discarded.

Information sources The research will be carried out using electronic databases, such as Scopus, Web of Science, and EBSCO. The Mendeley reference manager will manage the bibliographic references.

Main outcome(s) The present systematic review has been designed primarily to examine the impact of stress factors and consequences on human-robot interaction in an industrial context.

Quality assessment / Risk of bias analysis The articles included in this systematic review will be assessed for risk of bias (RoB) using AMSTAR 2 (A Measurement Tool to Assess Systematic Reviews). All studies will receive "yes", "no" or "partially yes" for each of the 16 criteria described in the evaluation instrument, classified as critical or non-critical. All items must be evaluated according to the tool's pre-specified criteria and answered with "Yes" in cases of a positive result, "No" in cases where there is no information available or when the evaluators consider that they cannot opt for the

benefit of the doubt, or "Partially Yes" when valid to indicate partial membership to the domain.

Seven of the 16 items are considered critical (items 1, 4, 7, 9, 11, 13 and 15), and, in the end, the assessment is classified with one of the following degrees of confidence: critically low (more than one critical failure), low (one critical failure), moderate (more than one non-critical failure) and high (none or one non-critical failure).

The quality rating will be estimated independently by two authors (A.P. and A.P.). Disagreement will be resolved by consensus.

Strategy of data synthesis Two reviewers (A.P. and A.P.) will independently screen titles and abstracts to identify articles that could potentially meet the inclusion criteria. These reviewers will retrieve and independently assess full versions of these articles to determine whether they meet the inclusion criteria. Any disagreement regarding study eligibility will be resolved by consensus, including a third reviewer (C.C. or J.C.G.).

Subgroup analysis N/A.

Sensitivity analysis N/A.

Language restriction Language restriction: There will be no language restrictions during the search and retrieval of studies. However, only publications in English will be selected for data extraction.

Country(ies) involved Portugal.

Keywords Stress; Factors and consequences of stress; Human-Robot interaction; Industrial context.

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