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(No) Need to Apply Agile?

A Review of the Literature and Agenda for Future Research on Job Satisfaction in Agile Information Systems Development

Veronika Huck-Fries · Rosa Spitzer · Jason Thatcher · Helmut Krcmar

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Abstract The continued popularity of agile information systems development (ISD) underscores its relevance to both researchers and practitioners. At the heart of the agile manifesto is the claim to value people over processes and, as a result, to increase employee job satisfaction. However, the research landscape on this topic is still heterogeneous and lacks a comprehensive overview. This manuscript develops a theoretical framework to guide future studies on job satisfaction in agile ISD. First, the status quo of job satisfaction in agile ISD within information systems and across the disciplines of computer science, psychology, and management is systematically reviewed and critically evaluated. Second, a theoretical framework consisting of three key themes is conceptualized. Third, based on the framework, significant research gaps are identified, and recommendations for future studies of agile ISD at the individual, team, and organizational levels are provided. Finally, strategic directions for the application of agile ISD practices are given.

Keywords Agile information systems development · IT project management · Job satisfaction · Inter-disciplinary · Literature review

1 Introduction

Given the rapid change, complexity, and uncertainty in the technological environment, organizations face challenging efforts when conducting information systems development (ISD) projects. ISD projects continue to have high rates of failure and exceed budget, time, and defined goals (Project Management Institute 2022). At the same time, these organizations face a shortage of information systems (IS) professionals and a highly competitive labor market on the human side (Prommegger et al. 2019). Work outcomes have been identified as a decisive factor in attracting and retaining information technology (IT) talent and thereby reducing voluntary turnover (Maier et al. 2022; Thatcher et al. 2002) – one of the most important and costly challenges for organizations.

To address these critical challenges, organizations increasingly adopt agile ISD (Rigby et al. 2018). A survey by Digital.ai reported that 94% of the participants' organizations practice agile ISD, and even 65% claimed that their organization has significant experience with agile practices (Digital.ai 2022). Agile ISD promises higher product quality through rapid delivery, continuous interaction, and transparency, and enables responses to change faster in dynamic environments (Dingsøyr et al. 2012).

One of the most striking aspects of agile ISD is that it increases team members' job satisfaction (Fowler and Highsmith 2001). The Agile Manifesto claims to value individuals and interaction over processes and tools. It also states that motivated individuals who are provided with the

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required environment and support and who are trusted to get the job done show higher job satisfaction, resulting in better performance. However, empirical evidence on the relationship between agile ISD and team member job satisfaction is mixed. On the one hand, studies report an increase in job satisfaction in agile ISD teams: Setor and Joseph (2020) found a positive effect of agile ISD practices on job satisfaction. Tripp et al. (2016) found that agile ISD practices can increase job satisfaction through increased job autonomy, task identity, and task significance. On the other hand, researchers suggest a decrease in job satisfaction in agile ISD teams: Fortmann (2018) found that agile ISD practices can have a depleting effect, resulting in lower job satisfaction among software developers. In contrast, other researchers suggest agile ISD practices to both increase and decrease team members' well-being (Benlian 2022).

Given the complex and heterogeneous nature of agile ISD, existing research findings on the relationship between agile ISD practices and job satisfaction are scattered and need a comprehensive overview. In a recent review of the literature, Meckenstock et al. (2022) examined the business value of agile ISD at the individual, team, organizational, and process levels. Dreesen et al. (2019) and Diegmann et al. (2018) identified in their literature reviews that research on “social interactions and behavior” such as job satisfaction exists, but broadly calls for “self-reflecting and reviewing” of the topic. To date, there has been little consolidation within the literature so far that provides a holistic perspective on job satisfaction in the context of agile ISD.

In this research, we take a step towards the integration of the current state of research by reviewing existing papers in the field of agile ISD and job satisfaction intra (information systems)- and interdisciplinary (computer science, psychology, and management disciplines). We synthesize existing research from different research streams and disciplines in the form of an organizing literature review (Leidner 2018). The following research question guides our literature review: *What is the effect of agile ISD practices on team members' job satisfaction?*

The literature review summarizes and classifies the existing literature to provide a basis for theorizing about agile ISD practices and job satisfaction. The nomological network of job satisfaction (Kinicki et al. 2002) is then used as a framework to synthesize the literature. Theory in the form of an emergent framework is recommended for organizing reviews (Leidner 2018), and framework development has been shown to be a fruitful approach for combining different theoretical constructs (Chen 2003; Füller et al. 2019). Based on our framework, we identify research gaps, provide recommendations for future agile ISD studies at the individual, team, and organizational

levels, and provide strategic directions for the application of agile ISD practices.

The remainder of this paper is structured as follows. Section 2 presents an overview of the literature on agile ISD. Section 3 describes the methodology, then Sect. 4 presents the results and analysis of the findings. Section 5 provides a discussion of the findings, including implications for theory and practice and directions for future research, and concludes the paper.

2 Theoretical Background

2.1 Agile Information Systems Development

The Agile Manifesto has been a catalyst for agile practices and has become the most widely used reference in the agile information systems development (ISD) literature. Beck et al. (2001) streamlined the core principles: in contrast to traditional/plan-based methods, agile ISD focuses on working software rather than detailed documentation. It thereby values individuals and their interactions over processes and tools, and collaboration over negotiation. By recognizing unpredictable conditions, agile ISD provides the flexibility to respond to continuous changes rather than static goals. Agile ISD has thus been classified as lightweight (Girma et al. 2019), featuring self-organizing teams, regular requirements meetings, direct communication, iterative and incremental delivery, and continuous integration of feedback (Jalali and Wohlin 2012; Shen and Xu 2015). In this research, we define agile ISD as “the continual readiness of an ISD method to rapidly or inherently create change, proactively or reactively embrace change, and learn from change while contributing to perceived customer value (economy, quality, and simplicity), through its collective components and relationships with its environment” (Conboy 2009, p. 340).

In this manuscript, we draw on the classification of Tripp et al. (2016) and differ between agile software development (SD) and project management (PM) practices.

2.2 Agile Software Development

When examining the agile SD literature, Diegmann et al. (2018) revealed that the state of research in agile received comparatively little academic attention overall, while some topics, such as agile methodology, have matured and continue to gain traction in practice. Findings include the following: Extreme programming (XP), the most studied agile SD method, was found to have a positive impact on software quality and to be most effective when outcomes are controlled (Maruping et al. 2009). Tessem and Maurer (2007) found that large teams using SD practices such as

pair programming (two people developing software together) were more motivated and satisfied in an agile context. Cockburn and Williams (2001) found that agile SD reduces bugs and positively influences design quality, team communication, and technical skills. Fowler (1997) argues for another powerful practice: refactoring, which leads to improved comprehensibility and ease of modification, thus reducing costs. Tripp et al. (2016) describe it as a way to restructure software by “removing redundancy, eliminating unused functionality, and refreshing obsolete designs” (p. 273). Within these practices, code standards reduce errors and improve consistency through norms (Boogerd and Moonen 2008), which is of utmost importance in the dynamic and numerous iterations that agile ISD fosters.

Although agile SD constitutes a socio-technical system and primarily presents sociological challenges (Lister and DeMarco 1987), this component is relatively peripheral in previous research (Diegmann et al. 2018). This is confirmed by McHugh et al. (2011) and Lalsing et al. (2012), who highlighted the need for academic and practitioner guidelines on job satisfaction in agile SD as these factors have been proven to be crucial for ISD project success (Boehm and Turner 2003) and in terms of IT professional turnover (Ahuja et al. 2007).

2.3 Agile Project Management

Due to increasingly dynamic and uncertain environments (Bennett and Lemoine 2014; Bergmann and Karwowski 2018), agile PM practices are a response to the challenge of developing not only agile and adaptive products but also teams (Highsmith 2004). They increasingly emerged after the Snowbird Meeting, where Beck et al. (2001) gathered and developed the Agile Manifesto, which includes principles for agile work (Cockburn 2001). Subsequently, Stare (2013) found that agile project teams are characterized by low hierarchies, the cultivation of broad knowledge, and fostering communication. On the management side, agile PM brought a continuous adaptation in execution with recurring planning cycles and solutions in the near term, all while maintaining constant customer interaction. Based on versatility and simplicity, Highsmith (2004) defined the core values of agile PM: “(1) employ iterative feature delivery, (2) deliver customer value, (3) champion technical excellence, (4) build adaptive teams, (5) encourage exploration, and (6) simplify” (p. 28).

Leybourne (2009) found creativity and innovation, as well as compression and learning as outcomes when applying these practices in well-functioning agile teams. In addition, the solution is considered to be comparatively closer to requirements as agile PM is more focused on deliverables than traditional project practices (Fernandez and Fernandez 2008). In addition to increasing customer

value, they foster employees’ growth by shifting the focus from static requirements to self-management and -discipline, as well as democratic decision-making processes (Conforto and Amaral 2010). In this context, Augustine et al. (2005) highlighted the importance of leadership and proposed an adaptive light-touch management style. It is of importance to understand the interplay and dynamics of all project parts and to direct the team into responding to continuous change with learning while providing as much freedom as possible. Sherehiy and Karwowski (2014) also considered the organizational structure: Supportive of agile PM practices are organizations that have as little hierarchies as agile project teams, have a high degree of flexibility, provide agile tools, and promote an appropriate culture.

2.4 Prior Work on Job Satisfaction

Job satisfaction has been one of the most researched topics in organizational psychology (Judge et al. 2002) over the past decades. Locke (1976) defined it as “a pleasurable or positive emotional state resulting from the appraisal of one’s job, or job experiences” (p. 1304). He further implicates the twofold nature of influences: cognitive and affective. Job satisfaction thus results from both thoughts and feelings. Fisher (2000) built on that, stating that while both components of job satisfaction had been proven equally relevant but dissimilarly caused, job satisfaction literature often sets cognitive variables as sole measures. Many job satisfaction theories evolved over time, Judge et al. (2002) classified them into: (1) situational theories including two-factor theory (Herzberg 1967), social information processing (Salancik and Pfeffer 1977), and job characteristics model (Hackman and Oldham 1980); (2) several studies (e.g., Agho et al. 1993; Brief et al. 1995; Judge et al. 1998; Niklas and Dormann 2005; Staw et al. 1986) that can be summarized as dispositional approaches recognizing individual diversity; and (3) interactive theories such as the Cornell model (Hulin 1991; Hulin et al. 1985) and the value-percept theory (Locke 1976). Thereof, Judge et al. (2002) identified three theories that have been backed most by scholars: “one of these (...) is, essentially, a situational theory (job characteristics model), another is a person theory (dispositional approach), and another is a person-situation interactional theory (value-percept model)” (p. 32). Interestingly, they all share the same core message: if individuals appreciate intrinsic job characteristics, increasing those represents the most effective method to raise the level of job satisfaction. Reviewing job satisfaction models, Sypniewska (2014) also found the construct of job contentment (affective response to job situation) often interchangeably used with job satisfaction. In that context, Fredrickson (2013) added that not only

people's feelings but also their interpretation of the environment is decisive for job satisfaction. As to its impact, Tee (2020) stated that job satisfaction decreases adverse effects, contributes to a psychological safe workplace and fosters employees' development. In their narrative review of IT turnover, Joseph et al. (2007) discussed the relation to job satisfaction. While most scholars confirm a coherence with satisfaction, the Unfolding Theory (Lee and Mitchell 1994) and Job Embeddedness Theory (Mitchell et al. 2001) suggest the possibility of reasons for leave apart from dissatisfaction, such as emotional or personal circumstances.

When reviewing further organizational psychology literature, the close link between job satisfaction and job perceptions became apparent (Mathieu et al. 1993). Attributes such as, e.g., the perceived variety and autonomy of an individual's task have early on proven to be influential factors (Turner and Lawrence 1965). In this regard, the Job Characteristics Model (JCM) has created particular awareness. Hackman and Oldham (1980) established five central characteristics (skill variety, task identity, task significance, autonomy, feedback) leading to diverse psychological states (feelings of meaningfulness and responsibility as well as knowledge of results), which repeatedly have been proven to impact job outcomes (e.g., Roberts and Glick 1981). Thereby, they laid the foundation for a proven relation between job perceptions and job satisfaction (Loher et al. 1985). Subsequently, emerging theories such as the Social Information Processing theory (Salancik and Pfeffer 1978) and James' (1978) theory acknowledged and further developed this finding. When comparing these approaches, Mathieu et al. (1993) highlighted the models' different nature of relationships: the JCM described job satisfaction as the outcome of job perceptions, Salancik and Pfeffer (1978) the other way around, and James et al. (1978) stated a reciprocal relation. Mathieu et al.'s (1993) study yielded a clear support for the latter in contrast to the two first unidirectional models (Table 1).

Beyond that, Kinicki et al. (2002) provides a nomological network of job satisfaction, which classifies antecedents, i.e., job characteristics, role states, group and organizational characteristics and leader relations, and consequences, i.e., motivation and citizenship behavior, withdrawal cognitions, withdrawal behaviors, and job performance, of job satisfaction (Fig. 1).

3 Literature Review

While literature reviews on agile SD are already scarce, even fewer studies were identified for agile PM. Some studies provide empirical evidence on the application of agile SD practices. In 2002, Abrahamsson et al. (2002) laid

the foundation for the agile narrative by reviewing the still limited research on agile to classify and define agile SD approaches. Two years later, Cohen et al. (2004) conducted a comprehensive review of empirical studies, anecdotal articles, and practitioners' learnings. Subsequently, Dybå and Dingsøyr (2008) reviewed 1,996 agile SD studies, of which they only identified only 36 of an empirical nature. A decade after the publication of the Agile Manifesto, Dingsøyr et al. (2012) reflected upon the research progress in a special issue. Overall, they found a steadily increasing number of publications and consequently highlighted several white spots to be considered in future research. These included the determination of the managerial and especially the organizational context. They concluded by urging agile scholars to take a more theory-based approach to identifying and embracing innovations earlier. Shortly thereafter, Hummel (2014) published a review of 482 papers. In another special issue, Abrahamsson et al. (2009) advance understanding of agility, contributed to the rigor of research, and identified the need for more research that goes beyond the adoption to the stage of actual use of agile practices. The most recent literature review is provided by Diegmann et al. (2018), covering a total of 775 papers. Among the findings were different trends in agile SD research: while topics assigned to the category "project, team, knowledge management, and leadership" are broadly covered, a research stream on social aspects was found to be clearly underdeveloped.

Regarding agile PM, most of the studies reviewed agile PM literature in a theoretical context, such as project success (Bergmann and Karwowski 2018), maturity models (Chagas et al. 2014), compared to traditional project management (Špundak 2014), or regarding the applicability of governance-related practices in agile projects (Lappi et al. 2018). No study was found that provided a narrative overview.

Narrowing the scope, to date no scholar has applied the literature review methodology in the context of agile and job attitudes, or more specifically JS and its related models. At first glance, this seems surprising, as job attitudes have been proven to have a significant impact on IT turnover (e.g., Joseph et al. 2007; Knudsen et al. 2009; McKnight et al. 2009; Mitchell et al. 2001) – one of the most important and costly challenges for IT organizations.

The objective of this literature review is to synthesize the existing research from various research streams and disciplines to provide a basis for theorizing about agile ISD and job satisfaction. The review can thus be classified as an organizing review in which "theory may take the form of an emergent framework that is used to synthesize the literature" (Leidner 2018, p. 556). In this case, the theory was not been selected a priori, but emerged as an appropriate

Fig. 1 The nomological network of job satisfaction, classifying antecedents and consequences of job satisfaction (Kinicki et al. 2002)



lens to synthesize the literature during the analysis of the literature (Leidner 2018) (Fig. 2).

Within the analysis of the literature, the nomological network of job satisfaction (Kinicki et al. 2002) emerged as an appropriate lens that serves to synthesize the literature. To understand the relationship between agile ISD and job satisfaction in detail, we conducted an intra- and interdisciplinary literature review that included both IS and non-IS literature. The literature review followed a three-step procedure and analyzed the results of (1) the agile literature, (2) job satisfaction in the ISD literature, and (3) job satisfaction in agile ISD (Online Appendix A, available online via <http://link.springer.com>) (Fig. 3).

Scopus, the largest scientific database for peer-reviewed literature, serves as the first point of evaluation. Pre-defined

queries and the advanced search mode are used to yield results. Following, a forward and backward search was carried out across further scientific resources. In line with Webster and Watson (2002), we first searched for contributions from top tier journals, increasing the probability to determine studies which have had a significant influence in either agile SD, agile PM or job satisfaction literature. In a second step, the search is broadened to less ranked journals and top management contributions. For the former, the researcher turns to the VHB ranking, the independent and leading journal assessment in German speaking countries, regularly published by the German Academic Association of Business Research (VHB 2020). They classify journals on a scale ranging from A + (excellent and internationally leading scientific business journals) to D (scientific

Table 1 Overview of existing theories and models on job satisfaction

Classification	Theory	Source	Description
Situational theories	Two-factor theory	Herzberg (1967)	Job satisfaction is influenced by motivating (e.g., achievement) and hygiene factors (e.g., salary)
	Social information processing	Salancik and Pfeffer (1977)	Individual needs and attitudes are influenced by social environment
	Job characteristics model	Hackman and Oldham (1980)	Five core job characteristics influence an individual's work experience and job satisfaction: skill variety, task identity, task significance, autonomy, feedback
Dispositional approaches	No specific theory	Agho et al. (1993)	Job satisfaction is based on a combination of environmental (opportunity), job characterization (routinization) and personality (work motivation)
	No specific theory	Brief et al. (1995)	Negative affectivity is negatively associated with job satisfaction, while positive mood-inducing events increase job satisfaction
	No specific theory	Judge et al. (1998)	Core self-evaluation (self-esteem, self-efficacy, locus of control, neuroticism) plays a critical role in how individuals perceive job satisfaction
	No specific theory	Niklas and Dormann (2005)	Affective experience (state affect) influence job satisfaction. Positive emotional experience during work can enhance job satisfaction, while negative state affects diminish JS
	No specific theory	Staw et al. (1986)	Job satisfaction tends to be stable over an individual's career, suggesting that job satisfaction is predicted by affective dispositions of an individual
Interactive theories	Cornell model	Hulin (1991); Hulin et al. (1985)	Job opportunities influence job satisfaction: high unemployment and low job opportunities increase job satisfaction, while abundant opportunities decrease job satisfaction
	Value-percept Theory	Locke (1976)	Job satisfaction is determined by an individual's values, with the determinants: supervision, pay, promotion, co-worker, work itself and working conditions

business journals). For the latter, the list of 50 journals that the Financial Times (FT) uses to compile its Research Rank (Ormans 2016) have been consulted additionally. The top VHB-organizational (psychology) journals (ORG) complement the search. Acknowledging the broad scope of this work covering contributions from business-, IS- and organizational literature the researcher will further run an attempt without indicating the specific field of study. Subsequently, the researcher initiates a backward search and finally consults further scientific databases, aiming at the most accurate coverage possible. To propose relevant search queries and design the search process as efficiently as possible, combinable search elements are determined as a start. Content-search elements encompass: “Agile Software Development” (ASD), “Agile Project Management” (APM), “Information Systems Development” (ISD), and “Job Satisfaction” (JS). For those, relevant and interchangeably used terms are identified by using the mind map technique, a commonly used approach in literature reviews (Eppler 2006). All content-search element-associations are then combined to different search queries. Additionally, search queries for literature-search elements (divided into “IS TOP” for top tier IS-journals, “IS ALL” for all A + to C ranked IS-journals, “ORG”, and “FT”) are built based on their international standard serial number (ISSN) and, if not accessible, their title. In the following, searches are conducted in four phases. The first three phases are restricted to the indicated literature, meaning the search queries are first combined with IS TOP-, then IS ALL-, FT-, and finally enhanced by ORG-literature. According to the previously set priorities, they each have a different focus: (1) JS in the agile context (“Search 1.1–1.4”), (2) JS within ISD (“Search 2.1–2.4”), and (3) on agile overall (“Search 3.1–3.4”). (4) The fourth phase includes the same search foci but has no literature constraints, solely focusing on the pre-defined content-search queries (“Search 4.1–4.3”). Detailed search queries are presented in online Appendix A. Table 2 presents an overview of inclusion and exclusion criteria.

For each discipline, leading journals were identified and searched for specific keywords within titles, abstracts, and keywords. A total number of 72 articles were analyzed, and 21 manuscripts were selected (Table 3 and Online

Appendix B). Figures 4, 5, 6, 7, 8 provide an overview of the evolution of agile ISD practices within the last years, the number of published papers per year, a temporal analysis of results, an overview of applied research methodologies, and an overview of publication outlets.

Based on the nomological network of job satisfaction (Kinicki et al. 2002), we find that the literature covers antecedents, moderators, and consequences of job satisfaction. Figure 9 and Table 4 summarize and present the themes that emerged from the literature. Each of the concepts is described in detail in the following.

4 Findings: Analysis of the Literature

4.1 Agile Software Development

Extant research on job satisfaction in agile SD is limited and primarily focuses on either a specific agile method or only the individual-, team- or organizational dimension (Tripp et al. 2016). Despite these limitations, prior findings show a trend: an overall positive influence of agile practices on job satisfaction. As a first indication, the following two reviews include more general studies. First, Dyba and Dingsoyr (2009) found a variety of studies reporting that agile practices increase job satisfaction, productivity, and client contentment. Second, Vacari and Prikladnicki (2015) systematically reviewed the agile literature with a focus on the public sector and declared agile practices a promising transition for public organizations that fosters job satisfaction.

Looking at specific methods, pair programming has been proven to lead to higher job satisfaction than developing alone (Balijepally et al. 2009; Pedrycz et al. 2011). XP had the same effect but also increased productivity rates and improved perceptions of the work environment (Mannaro et al. 2004). The latter resonates with Tarasov (2019). When the method was not stated explicitly, most research referred to at least pair programming, refactoring, and code standards.

Characteristics of agile practices such as increased collaboration, self-organizing teams, and collective code ownership were most highly correlated with job

Table 2 Overview of inclusion and exclusion criteria of the literature review

Criterion	Rationale of inclusion criterion (IC)/Exclusion criterion (EC)
IC1	The article was published in English language
IC2	The publication consisted of a full article, i.e., not a keynote, poster or opinion
IC3	The article was published either in a journal or proceedings of a conference
EC1	Duplicates were removed from the findings
EC2	Publications that did not examine agile ISD or PM practices were excluded
EC3	Studies that do not focus explicitly on job satisfaction were excluded

Fig. 2 The theory-review symbiosis (Leidner 2018, p. 556), enabling to distinguish between four different types of reviews

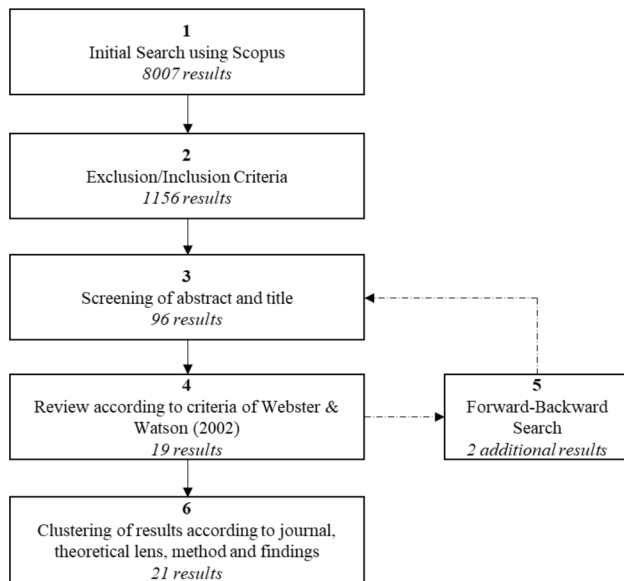
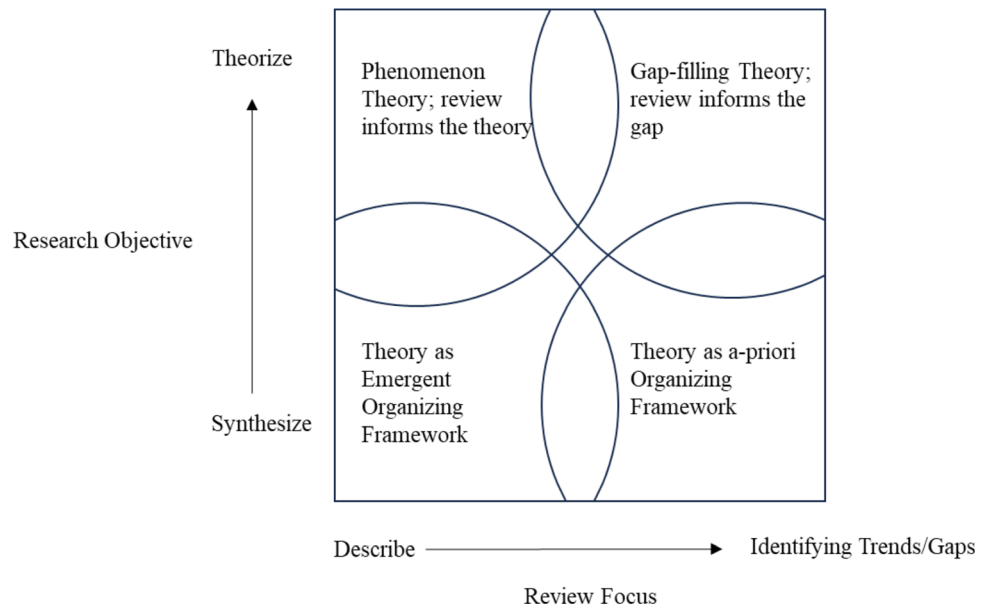


Fig. 3 Overview of the methodological procedure of the literature review

satisfaction. The same was true for time to market and the focus on technical quality – components that have been influenced by agile practices (Kropp et al. 2018).

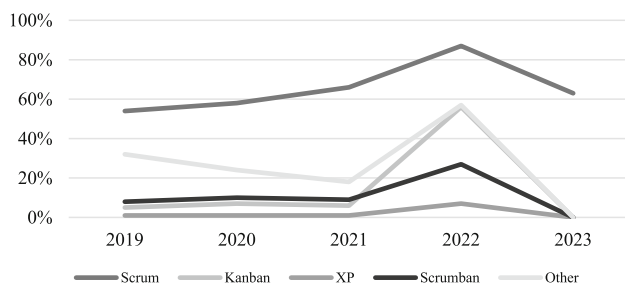
Additional indicators of satisfaction have been identified by Grigori Melnik and Frank Maurer (2006): being part of the decision-making process, access to interesting projects, interaction with users, and direct relationships with users are twice as common among satisfied agile developers as among traditional developers. They further found a positive correlation between job satisfaction and how advanced agile practitioners were. Acuña et al. (2009) provided a new perspective, looking at personality factors among

other things, and found that developers who scored high on agreeableness and conscientiousness showed the highest job satisfaction. They also found a correlation between extraversion and software quality.

When reviewing the agile literature, we found that the individual level has partially been included by integrating job perceptions/characteristics. For instance, Acuña et al. (2009) found that the job satisfaction level depends on task conflict and freedom of choice in the organization of their work. Pedrycz et al. (2011) extended these findings and identified work sustainability (including sustainable workload, low stress, and high task significance), interdepartmental communication and interdeveloper communication as factors increasing job satisfaction. Tripp et al. (2016) used the same theoretical lens but pioneered the explicit distinction between agile SD practices and agile PM practices. They added findings including a positive relationship between both practices and how developers perceive their work as well as direct effects between agile SD practice use and job satisfaction. They conclude that both agile SD and agile PM practices should be used to maximize developer's satisfaction and call for further research, especially regarding job characteristics. Sun and Schmidt (2018) built on this by examining the extent of agile practice use (considering pair programming, continuous integration, refactoring, regression testing, collective ownership, coding standards) with regard to several job perceptions. For the use of agile practices, they found high professional efficacy and job satisfaction, moderate work overload, and low cynicism. They found even higher professional efficacy and job satisfaction, lower work ambiguity, exhaustion, and individual autonomy for high agile

Table 3 Overview of literature search results

Literature review – search results						
Search foci	Content search query	Literature constraints				
		AND IS TOP	AND IS ALL	AND FT	AND IS ALL OR FT OR ORG	None
(1) JS in the agile context	ASD OR APM AND JS	4 (Search 1.1)	14 (Search 1.2)	0 (Search 1.3)	14 (Search 1.4)	72 (Search 4.1)
(2) JS in the ISD context	JS AND ISD	34 (Search 2.1)	113 (Search 2.2)	18 (Search 2.3)	124 (Search 2.4)	768 (Search 4.2)
(3) Agile literature	ASD OR APM	91 (Search 3.1)	1156 (Search 3.2)	28 (Search 3.3)	1178 (Search 3.4)	8007 (Search 4.3)

**Fig. 4** Overview of evolution of agile practices since 2019

use. Interestingly, they found no difference regarding role conflict, work overload, and cynicism.

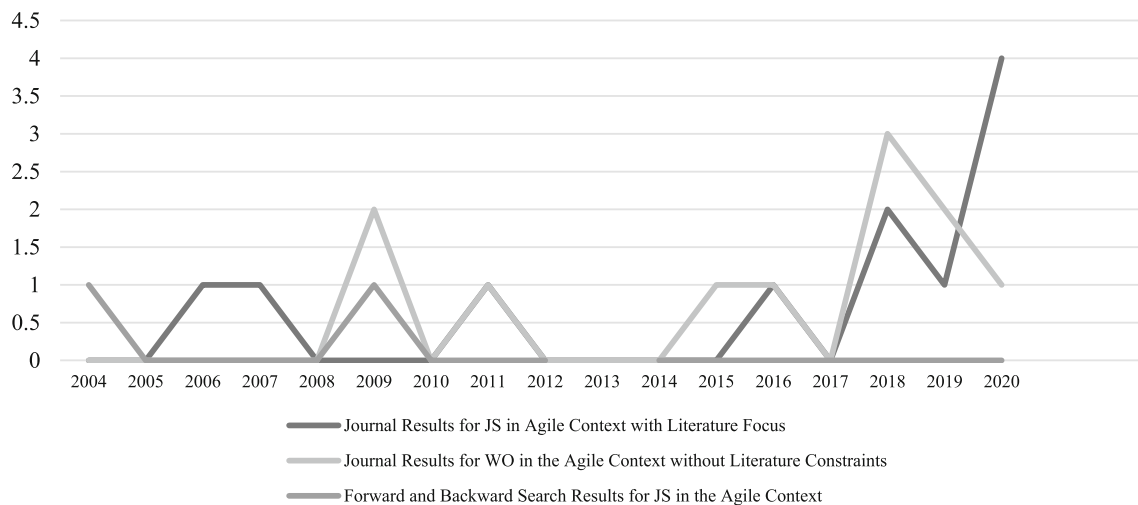
Considering the team level, Gupta et al. (2018) reported that the relationship between job satisfaction and agile teams was negatively affected by agile ISD. Lindsjörn et al. (2016) explored teamwork quality and project success in agile teams. Thereby, they found agile SD to have a strongly positive effect on learning and work satisfaction.

At the same time, they reported only marginally higher team performance for agile teams.

Concluding, Setor and Joseph (2020) addressed a frequently asked question and set agile practices into context with job satisfaction and retention. They confirmed their hypothesis that agile ISD practices reduce the intention to quit due to their positive effect on job satisfaction. Interestingly, this relation was weaker in larger organizations than in smaller ones.

4.2 Agile Project Management

Compared to agile SD, research on agile PM and its impact on job satisfaction has yielded limited results. Based on the agile PM literature and with regard to the job satisfaction context, Tripp et al. (2016) identified the following practices derived from the agile PM literature: (1) *Daily stand-ups* refers to daily, time-limited team meetings aiming at progress transparency and often guided by questions varying according to the agile method (Schwaber and

**Fig. 5** Number of published papers per year

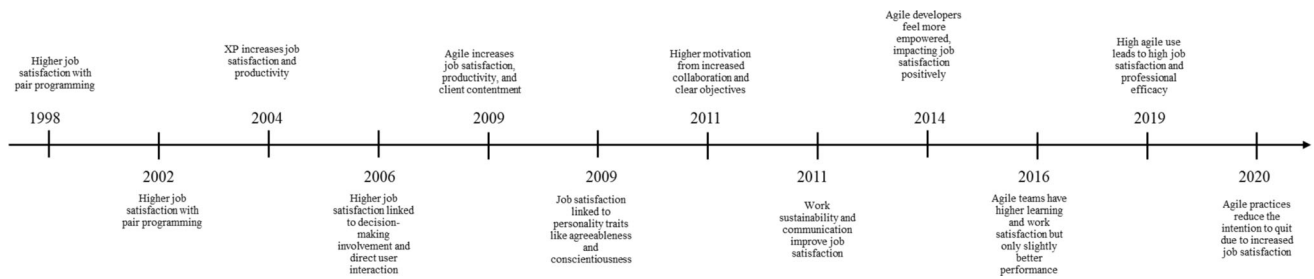


Fig. 6 Timeline of results

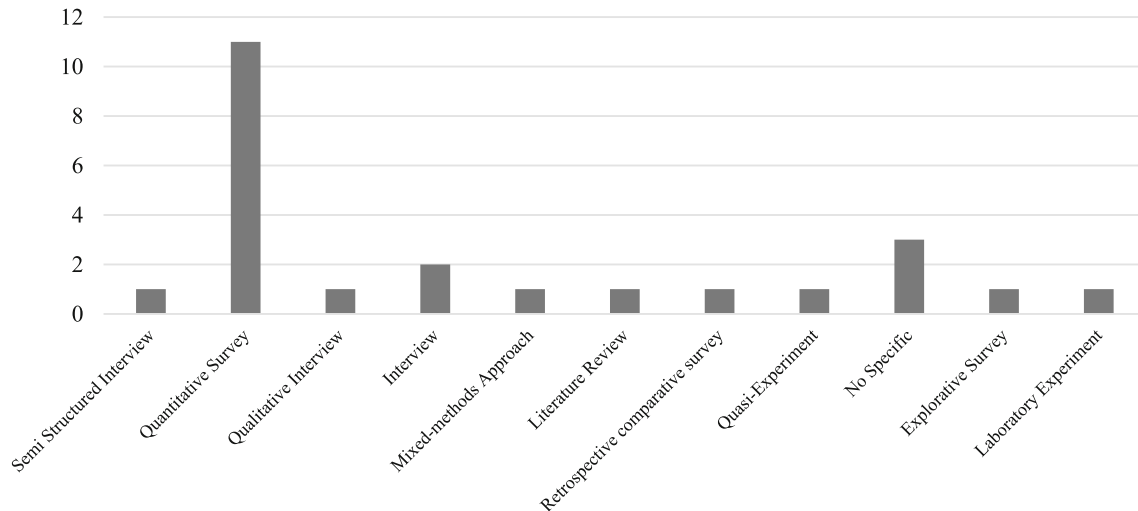


Fig. 7 Overview of applied research methodologies

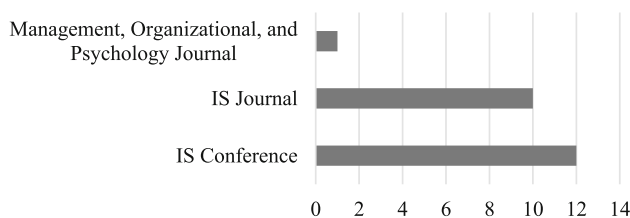


Fig. 8 Overview of publication outlets

Beedle 2002). Stray et al. (2018) found that daily stand-up meetings reduce job satisfaction, trust, and well-being but at the same time hold opportunities to empower teams when adjusted in the right direction. (2) *Iterative delivery* refers to gradual release and iteration planning shaped by direct feedback and leading to a better predictable velocity (defined as the amount of work per cycle) once some iterations have been completed (Tripp et al. 2016). At the end of an iteration, (3) *retrospectives* take place, serving the purpose of reflection and uncovering enhancement areas (Schwaber and Beedle 2002). Employees linked scrum methods such as iteration planning and retrospectives as well as daily stand-up meetings with autonomy, feedback, and diverse skills, overall leading to more satisfied team members (Tessem and Maurer 2007).

Throughout the project, (4) *burndown charts* provide visual support to keep track of finished and open assignments per iteration/ release, also contributing to better calculating velocity (Sutherland 2001). Tripp et al. (2016) found a positive link between agile SD, agile PM, and how individuals perceive job characteristics. They further indicated positive interaction effects between employing agile SD and agile PM practices and their impact on job autonomy. Gupta et al. (2018) confirmed a positive relation between agile PM and job satisfaction.

At the organizational level, Bracht et al. (2018) built on the aspect of agile self-organizing teams and proposed a self-leadership-culture model that should have positive effects on job satisfaction. Finally, Issa et al. (2019) reported agile PM practices to support factors that are known to increase job satisfaction, such as recognition/ rewards, job security, and the work environment.

4.3 Moderators

Job characteristics have been found to affect the relationship between agile ISD and job satisfaction. Tessem and Maurer (2007) and Tripp et al. (2016) found a positive influence of agile practices on job autonomy, skill variety,

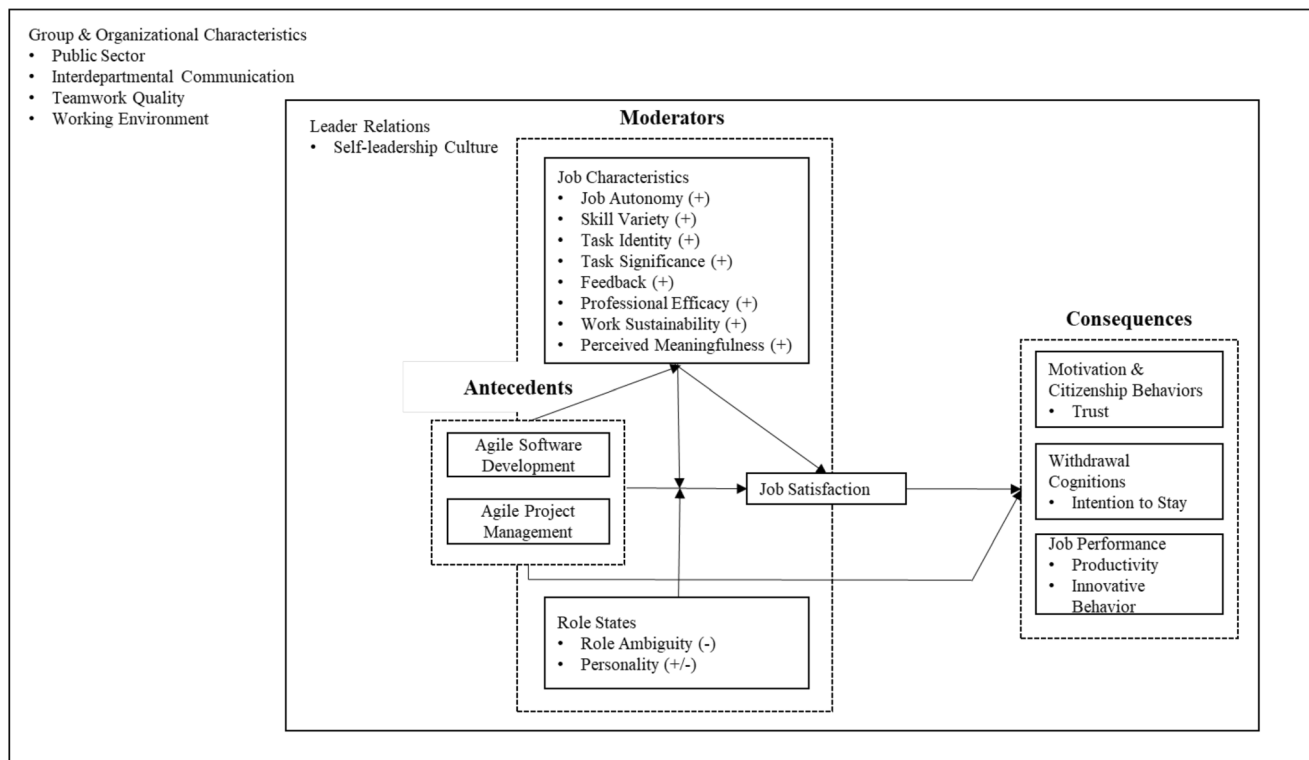


Fig. 9 Overview of the model of job satisfaction in agile ISD

task identity, task significance, and feedback. Employees' professional efficacy is higher when agile practices are used (Sun and Schmidt 2018). Communication and work sustainability contribute to job satisfaction in agile teams (Pedrycz et al. 2011).

Furthermore, an influence of role states on agile ISD practices and job satisfaction has been found. Agile teams report lower role ambiguity (Sun and Schmidt 2018). Personality facets, such as consciousness and agreeableness, are positively related to job satisfaction in agile teams (Acuña et al. 2009).

Similarly, group and organizational characteristics predict job satisfaction in agile teams. Agile ISD practices have been found to have a positive impact on the work environment (Issa et al. 2019). A good quality of teamwork, which includes communication, coordination, balance of member contributions, mutual support, effort, and cohesion, leads to increased job satisfaction (Lindsjörn et al. 2016). Interdepartmental communication increases job satisfaction in agile teams (Pedrycz et al. 2011). In the public sector, agile ISD practices are positively associated with job satisfaction (Vacari and Prikladnicki 2015).

Leader relations have been found to be significant in agile ISD. Bracht et al. (2018) propose that a self-leadership culture in agile teams can be beneficial for job satisfaction.

Overall, we identified several moderating variables that affect the relationship between agile ISD practices and job satisfaction.

4.4 Consequences

The use of agile ISD practices is directly and indirectly related to consequences. Daily stand-up meetings can lead to decreased job satisfaction and trust (Stray et al. 2018). The relationship between agile ISD practices and the intention to stay with the current employer is fully mediated by job satisfaction (Setor and Joseph 2020). Self-leadership culture, as practiced in agile teams, has been proposed to be positively associated with productivity and innovative behavior (Bracht et al. 2018).

5 Research Gaps

The review of the literature reveals several significant research gaps. In the following section, key aspects of the literature on job satisfaction in agile ISD are analyzed.

Table 4 Results of the literature review

Construct	Description	References
Antecedents	Agile software development Agile project management	Fortmann-Mueller (2018)
		Tripp et al. (2016)
		Dyba and Dingsoyr (2009)
		Vacari and Prikładnicki (2015)
		Stray et al. (2018)
		Issa et al. (2019)
		Gupta et al. (2018)
		Mannaro et al. (2004)
		Balijepally et al. (2009)
		Bracht et al. (2018)
		Sun and Schmidt (2018)
		Pedrycz et al. (2011)
		Tarasov (2019)
		Kropp et al. (2018)
		Melnik and Maurer (2006)
		Acuña et al. (2009)
		Lindsjörn et al. (2016)
Moderators	Job characteristics: job autonomy, skill variety, task identity, task significance, feedback, professional efficacy, work sustainability	Setor and Joseph (2020)
		Tessem and Maurer (2007)
		Tripp et al. (2016)
		Pedrycz et al. (2011)
		Sun and Schmidt (2018)
		Sun and Schmidt (2018)
		Acuña et al. (2009)
		Issa et al. (2019)
		Lindsjörn et al. (2016)
		Pedrycz et al. (2011)
Consequences	Group & organizational characteristics: working environment, teamwork quality, interdepartmental communication, public sector	Vacari and Prikładnicki (2015)
		Bracht et al. (2018)
		Stray et al. (2018)
		Setor and Joseph (2020)
		Bracht et al. (2018)
	Leader relations: self-leadership culture	
	Motivation & citizenship behaviors: trust	
	Withdrawal cognitions: intention to stay	
	Job performance: productivity, innovative behavior	

5.1 Agile Software Development and Project Management

5.1.1 Research Gap #1: Agile ISD Practices

In the existing literature, agile ISD practices have commonly been divided into agile software development and agile project management practices. A number of studies have investigated either the one (agile software development: e.g., Hemon et al. (2018), Dyba and Dingsoyr (2009)), the other (agile project management: e.g., Gupta et al. (2018), Issa et al. (2019)) or both (agile software development and agile project management: e.g., Fortmann-Mueller (2018)). A recent survey shows that the five most commonly used agile practices are daily stand-up meetings (87%), retrospectives (83%), sprint / iteration

planning (83%), sprint / iteration reviews (81%), and short iterations (63%) (VersionOne 2022). While stand-up meetings (Stray et al. 2018) and pair programming (Balijepally et al. 2009) have been examined in earlier studies, empirical evidence about additional practices is needed.

5.2 Moderators

5.2.1 Research Gap #2: Job Characteristics in Agile ISD

In the job characteristics model (Hackman and Oldham 1980), job characteristics refer to task significance, task identity, skill variety, autonomy, and feedback. In the course of the literature review, we found evidence that job characteristics influence the relationship between agile practices and job satisfaction (Pedrycz et al. 2011; Sun and

Schmidt 2018; Tessem and Maurer 2007; Tripp et al. 2016). However, a number of job characteristics that are essential in agile ISD have not been examined in existing studies.

5.2.2 Research Gap #3: Role States in Agile ISD

According to role theory, a role includes a set of expectations, defined by oneself or others, about what is appropriate and what is not (Biddle 2013; Katz and Kahn 1978). The application of agile practices fundamentally changes the way work is done (Tripp et al. 2016) and restructures the roles and responsibilities of team members (Mueller and Toutaoui 2020). Venkatesh et al. (2020) examined role ambiguity and role conflict and found them to be positively related to software developer exhaustion in agile ISD teams.

5.2.3 Research Gap #4: Leader Relations in Agile ISD

Agile ISD fundamentally changes work for team members, including leaders and managers (Tripp et al. 2016). Agile ISD emphasizes the self-organizing nature of teams and thus eliminates the job and role description of these groups (Shastri et al. 2021). Agile ISD practices can shift leaders and managers from traditional command and control practices, where they define rules and goals (Nerur et al. 2005), to become adaptive leaders, where they craft processes in order to fulfill collective rules and goals (Augustine 2005). Practical evidence indicates that agile ISD projects are still led by the role and position of leaders and managers and highlights their ongoing relevance (VersionOne 2020), suggesting that leaders and managers are omnipresent. The presence of leaders and managers has been identified as an essential driver for the effectiveness of agile ISD (Cockburn and Highsmith 2001; Highsmith 2004). The existing research calls for more studies on leadership in agile ISD teams (Mueller et al. 2021). The Project Management Institute (2017) states that “the role of the project manager in an agile project is somewhat of an unknown, because many agile frameworks and approaches do not address the role of the project manager” (p. 37). Mueller and Toutaoui (2020) argue that “there is a paucity of empirical research on IT PMs in agile ISD team settings” (p. 2). Modi and Strode (2020) found in a review of the literature that the research landscape on leadership in agile ISD is still deficient which calls for more empirical evidence on the subject.

5.3 Job Satisfaction

5.3.1 Research Gap #5: Job Satisfaction in Agile ISD

Job satisfaction has been studied extensively in the IS literature. While the review of the literature indicates a solid, although scattered base of job satisfaction in agile ISD, we lack an understanding of further, less traditional work outcomes in agile ISD, such as job crafting (Tims et al. 2012).

5.4 Consequences

5.4.1 Research Gap #6: Motivation and Citizenship Behavior in Agile ISD

Studies in the agile ISD literature have examined motivation (McHugh et al. 2011) and citizenship behavior, namely trust (Stray et al. 2018). However, we lack a) in-depth insights into these relationships and b) further empirical evidence of citizenship behavior in agile ISD teams.

5.4.2 Research Gap #7: Withdrawal Cognitions in Agile ISD

Although the scarcity of IS professionals has become a major challenge for organizations, the literature review indicates that the influence of agile practices on voluntary turnover of IS professionals has largely been ignored.

It remains uncertain whether agile ISD practices effectively reduce the frequent turnover of IS professionals, despite the reality that turnover is often unavoidable in practice. In one study, Setor and Joseph (2020) examined job satisfaction as a mediating variable between agile practices and employees' intention to stay with their current employer. However, we lack a deeper understanding of these interdependencies.

5.4.3 Research Gap #8: Job Performance in Agile ISD

The literature on job satisfaction proposes a direct positive effect on organizational outcomes, such as job performance (e.g., Weinert and Weitzel 2023). However, we lack an understanding of how job satisfaction affects ISD project success. Being a well-known challenge in the software industry, two thirds of ISD projects are categorized as challenging or even failing, in which shows that only one third of projects are completed on time, on budget, and with predefined software quality. Our review of the literature revealed that none of the studies explored how job satisfaction is related to project success in ISD.

5.4.4 Research Gap #9: Group and Organizational Characteristics in Agile ISD

Although the majority of the reviewed studies investigated job satisfaction at the individual level, we argue that IS researchers currently missing promising insights by not considering the team and organizational level. Hence, an avenue for future research is the examination of intra- and interdependencies between individuals, teams, and organizations. Venkatesh et al. (2022) suggest the application of three-level models to better incorporate the influence of hierarchically proximal and distal contexts.

5.4.5 Research Gap #10: Mixed Methods Research in Agile ISD

Quantitative research designs have been dominantly used in the existing literature (e.g., Fortmann-Mueller 2018). However, the current research does not explain why and how team members of agile ISD projects are more and others are less satisfied.. Researchers argue that particularly the literature on agile ISD lacks a “theoretical core” (Tripp et al. 2018) (Table 5).

6 Research Agenda

6.1 Agile Information Systems and Project Management

6.1.1 Research Gap #1: Agile ISD Practices - Proposed Research Direction: Examining Single Agile ISD Practices

There is great potential for future research to better understand the influence of individual Agile ISD practices on employee job satisfaction. For example, retrospectives refer to meetings that are held at the end of an iteration with the goal to reflect on the previous iteration and identify possibilities for improvement (Schwaber and Beedle 2002). Although retrospectives are one of the most applied agile practices in organizations, little research has been conducted on effects of retrospectives (Dybå et al. 2014). Retrospectives are claimed to foster personal growth and learning (Derby and Larsen 2006) and thus may directly affect team members’ job satisfaction. At the same time, retrospectives often fail to get transferred across ISD teams and are often repeated in the same manner, which may result in demotivation and poor results (Przybyłek et al. 2021). Retrospectives vary widely in structure, scope, and participants; therefore, future studies are needed to examine the characteristics of retrospectives and their influence on team members’ job satisfaction. Experimental

research designs could help provide more in-depth insights into the relationship between characteristics of the retrospective and job satisfaction. We thus ask: *What is the effect of single agile ISD practices on team members’ job satisfaction? How and why do retrospectives influence team members’ job satisfaction?*

6.2 Moderators

6.2.1 Research Gap #2: Job Characteristics in Agile ISD - Proposed Research diRection: Examining Job Demands, Job Resources, and Personal Resources

There is a need for researchers to gain an in-depth understanding of the particular job characteristics in agile ISD. Bakker and Demerouti (2014) propose that work outcomes, such as job satisfaction, result from an interplay between job demands and job resources. While some empirical evidence of more traditional job demands and resources, such as work overload (Huck-Fries et al. 2019; Mueller and Benlian 2022; Rietze and Zacher 2022), job autonomy (Huck-Fries et al. 2019; Rietze and Zacher 2022; Tripp et al. 2016) and feedback (Rietze and Zacher 2022; Tripp et al. 2016) in agile ISD exists, we lack an understanding of specific demands and resources that apply to agile ISD. For example, Mueller and Benlian (2022) found that agile ISD practices can affect team members’ self-regulation and their feelings of fatigue. First, this might be due to distractions and interruptions. Agile ISD practices involve communication and collaboration among team members and might thus interrupt software developers in their daily work. Wiesche (2021) classified three types of interruptions: programming-related work impediments, interaction-related interruptions, and interruptions imposed by the external environment. All types of interruptions have been found to occur in agile ISD teams. Second, an effect on self-regulation could be caused by high levels of collaboration and communication (Mueller and Benlian 2022). Informal communication, as in agile ISD, might result in a lack of understanding of problems and omit challenging problem-solving activities.

Additionally, Eilers et al. (2022) found that learning spirit can be an important resource in agile ISD projects: it refers to “the degree to which an actor evaluates openness and searches positively for new things regarding their work” (p.10). Learning spirit allows knowledge gaps and failures to be categorized as learning opportunities, so that individuals actively seek technological innovations for their work. In addition, they found that empowered self-guidance, which is “the extent to which actors positively value reflection on themselves and their work processes, organize themselves, and take responsibility for their work” (Eilers et al. 2022, p. 10), is beneficial for agile ISD

teams. It enables proactive decision-making and reflection on work progress. Both learning spirit and empowered self-guidance might affect job satisfaction. Further, Prommegger and Krcmar (2021) suggest that social support in the workplace can act as a resource, finding that social support in the workplace can influence negative emotions and turnover among IS professionals. The collaborative nature of agile ISD might thus affect workplace social support and job satisfaction.

Bakker and Demerouti (2014) argue that job resources can buffer the impact of high demands on work outcomes: Job resources can act as a coping mechanism to handle high demands at work. Hence, future studies on agile ISD could examine the interdependencies between job demands and resources. We thus ask the following: *What are team members' particular job demands and resources in agile ISD? How do agile practices change team members' job demands and resources? Can job resources buffer high job demands in agile ISD?*

6.2.2 Research Gap #3: Role States in agile ISD - Proposed Research Direction: Exploring Roles in Agile ISD

Agile ISD requires team members to switch between different roles. For example, Maruping and Matook (2020) found that team members often face role multiplexity, i.e., transitions in to and out of a predefined role. They argue that agile ISD requires assisting and assessing simultaneously as well as handling potentially opposing and different orientations, which challenges team members and results in role multiplexity. Consistent with this, team members in agile ISD may perceive role identity tensions and ambiguity (Huck-Fries et al. 2020; Mueller et al. 2021). These tensions result from a change in roles, responsibilities, control, collaboration, and communication caused by the application of agile ISD practices. Often, roles and responsibilities in agile ISD teams are not formally defined, which allows team members to conceptualize their own mental representation of duties and responsibilities. Control modes and styles in agile ISD differ from traditional waterfall ISD: agile ISD teams decide for themselves and work according to a bottom-up approach. Collaboration and communication between team members is free of hierarchical structures and usually takes place at eye level. All these facets can foster role tensions among team members. Both role multiplexity and role identity tension might affect team members' job satisfaction. We therefore ask: *Which roles exist in agile ISD teams? How do role multiplexity and role identity tensions affect job satisfaction?*

6.2.3 Research Gap #4: Leader Relations in Agile ISD - Proposed Research Direction: Leading Agile ISD Teams

Future studies are encouraged to examine leadership and management in agile ISD teams. Agile ISD projects rely on self-organizing principles and thus require a particular form of leadership that goes beyond traditional leadership styles. Leaders in agile ISD are important for coordination, mentoring, negotiation, and adaption to processes (Shastri et al. 2021). The leader's role ranges from supporting agile ISD teams and coordinating their performance over managing customer and cost requirements to customizing agile ISD (Shastri et al. 2017). This indicates that they impersonate the voice of the agile ISD team to members of the organization. Biehler et al. (2022) observe the phenomenon of emergent leadership in agile ISD teams. They provide evidence for two distinct types of emergent leaders: a "detail-oriented structurer" and a "big picture coordinator". Emergent leaders of type "detail-oriented structurer" act as an informal leader who takes initiative to organize and structure meetings and is perceived by team members as being highly competent, encouraging, and a role model. This leader supports team members in task completion by explaining functions and goals. Emergent leaders of type "big picture coordinator" manage the whole picture, break it down into concrete steps, and take on coordinative tasks. They also take a mediating function in discussions and are perceived as rather relation- than task oriented compared to other leadership types. Future studies could examine how these different types of leadership affect job satisfaction of both team members and leaders. Additionally, remote work and hybrid working modes have significantly changed leadership in agile ISD. Hence, it is essential to understand the role of leader control modes and control styles. Remus et al. (2020) provide evidence that formal control negatively influences job satisfaction while enabling control styles foster job satisfaction. Wiedemann et al. (2023) examine control and tension in ISD teams. Future research is encouraged to examine the role of agile ISD practices in leader control modes and styles. Thus, we ask the following questions: *How does emergent leadership influence team members' job satisfaction? How do different leader control styles and modes affect team members' job satisfaction? What is the effect of telework on leader control styles and modes in agile ISD teams?*

6.3 Job Satisfaction

6.3.1 Research Gap #5: Job Satisfaction in Agile ISD - Proposed Research Direction: Going Beyond Traditional Work Outcomes

Future studies are encouraged to examine work outcomes that go beyond traditional work outcomes, such as job satisfaction (e.g., Huck-Fries et al. 2022). For example, future research is suggested to investigate job crafting behavior, i.e., “the self-initiated change behaviors that employees engage in to align their jobs with their own preferences, motives, and passions” (Tims et al. 2012). Agile ISD makes it possible to react to both changes as well as to bring about change itself and might thus lead to an increased willingness to change on the part of employees. Junker et al. (2022) argue that agile ISD fosters proactive behavior in teams. The self-organizing and autonomous nature of agile ISD might enable employees to craft their jobs and, as a result, complete their work tasks more successfully. Distinguishing between approach- and avoidance-oriented job crafting might enable researchers to provide a more nuanced picture of job crafting in agile ISD teams. Additionally, future studies might examine the influence of agile ISD on workgroup embeddedness. Workgroup embeddedness refers to perceptions of strong social ties and closeness with team members, fit within the group, and (in) tangible benefits if one leaves the group (Dinger et al. 2022). In agile ISD, certain practices, such as refactoring and pair programming, can create a high degree of interdependence among team members (Cockburn and Highsmith 2001), which should affect their embeddedness in the workgroup. Overall, the collaborative and communicative nature of agile ISD might foster workgroup embeddedness.

While cross-sectional research designs dominate the existing literature on agile ISD, Benlian (2022) and Tuomivaara et al. (2017) provide evidence that work outcomes may vary between different stages of the iteration and project. Maier et al. (2023) pinpoint significant limitations of cross-sectional research designs in IS, such as missing temporal order between constructs, inadequate capabilities to test for temporal causality, and difficulties to assess cause-effect relationships. Longitudinal research designs assessing data on different points of measurement might help to overcome the existing limitations. For example, job crafting on a daily level (“daily job crafting”) could provide insights into the varying stages of the project.

We therefore ask: *What is the effect of agile ISD practices on team members’ job crafting behavior? How do agile ISD practices affect workgroup embeddedness? Do*

work outcomes vary between different stages of the project?

6.4 Consequences

6.4.1 Research Gap #6: Motivation and Citizenship Behavior in Agile ISD - Proposed Research Direction: Analyzing Intrinsic Motivation and Extra-Role Behavior

We need a richer understanding of how agile ISD practices impact team members’ motivation, particularly intrinsic motivation. Consistent, successful accomplishment of ISD projects hinges on the motivation of the developers (Procaccino et al. 2005), as employees’ motivation strongly correlates with performance improvement (Beecham et al. 2008). However, the research in agile ISD is mostly focused on the technical perspective rather than on the connection with the human or social factor (Dybå and Dingsøyr 2008; Whitworth and Biddle 2007). This, ironically, contradicts a guiding principle of the Agile Manifesto, which puts people over processes (Fowler and Highsmith 2001). Intrinsic motivators are those that come from within a person, such as, feelings of accomplishment, of doing important work, of autonomy, and freedom (Miner 2005, p. 109). Intrinsic motivation is particularly important in ISD as software development is categorized as knowledge-intensive work (Tiwana 2004). Self-organization, the freedom to decide on the type and amount of work to deliver, and a sense of connection between employees and the company – enhanced by agile ISD practices (Iivari and Iivari 2011) – may serve as key intrinsic motivators, fostering employees’ satisfaction with their work. Malik et al. (2021) argue that agile ISD practices constitute a source of motivation, and Memeti et al. (2021) found that agile ISD practices can affect team members’ psychological needs as predictors of their motivation.

Extra-role behavior includes behavior such as proactive behavior, i.e., self-initiated, future-oriented behavior that brings about change in situations or in oneself (Parker et al. 2010). Agile ISD fundamentally restructures team members’ work in that it changes workplace structures, relies on self-organizing principles, and provides a high amount of autonomy. Proactive behavior is change-oriented (Van Dyne and LePine 1998) and might thus be affected by the use of agile ISD practices. Gaining a deeper understanding of these positive workplace outcomes is essential, so we ask: *How do agile ISD practices affect team members’ intrinsic motivation? What is the effect of agile ISD practices on extra-role behavior?*

6.4.2 Research Gap #7: Withdrawal Cognitions in Agile ISD - Proposed Research Direction: Determining Voluntary Turnover of IS Professionals

Future research is encouraged to gain more insights into the relationship between agile practices, job satisfaction, and voluntary turnover of IS professionals. Prommegger and Krcmar (2021) identify job satisfaction, while Huck-Fries and Talalaieva (2022) theorize about work engagement as predictors of voluntary turnover. While existing studies propose a linear relationship between agile ISD practices and job satisfaction, future research could investigate u-shaped effects considering perceived telework disparity (Maier et al. 2022) and life-work conflict (Weinert and Weitzel 2023). Maier et al. (2022) found that perceived telework disparity, i.e., “a contrast-oriented, upward comparison of a regular office worker with their colleagues’ telework”, negatively affects employees’ job satisfaction. Weinert and Weitzel (2023) identified life-work conflict as a predictor of job satisfaction. Given that agile teams commonly practice telework (VersionOne 2022), we encourage future studies to examine whether perceived telework disparity and life-work conflict might constitute a turning point of a u-shaped relationship between agile practices and job satisfaction and, as a result, voluntary turnover. We thus ask the following: *What is the effect of agile practices on perceived telework disparity and life-work? How do these constructs affect voluntary turnover?*

6.4.3 Research Gap #8: Job Performance in Agile ISD - Proposed Research Direction: Studying Project Characteristics

Agile practices can affect ISD project success (Cucolaş and Russo 2023). Hence, future studies might examine how team members’ job satisfaction can influence this relationship. For example, job satisfaction might act as a mediator between agile practices and ISD project success. Additionally, future research might focus on the examination of ISD project characteristics, such as large-scale ISD (i.e., projects with 50 or more employees or at least six teams, Dikert et al. (2016)). The State of Agile Survey (VersionOne 2022) states that the software organizations of 66% of the employees have 100 or more people working for them, indicating that large-scale projects comprise a significant part of ISD projects. The existing literature indicates significant challenges in large-scale ISD projects, such as inter-team communication and coordination (Bjarnason et al. 2022). Future studies are needed to investigate the particularities of large-scale ISD, job satisfaction, and project success. Facing the demands of globalization, multinational organizations are increasingly

required to conduct inter-organizational ISD projects, which standardize systems across regions and countries (Sarker et al. 2010). There is a need to investigate how job satisfaction and ISD project success are related to each other in inter-organizational projects. We therefore ask the following questions: *What is the effect of team members’ job satisfaction on ISD project success? How do the results vary in large-scale ISD projects? How can inter-organizational ISD projects be successfully conducted?*

6.4.4 Research Gap #9: Group and Organizational Characteristics in Agile ISD - Proposed Research Direction: Using the Power of Nested Data

Team members of agile ISD teams form a “group of people that work together to build new software systems and modify existing software systems” (Tripp et al. 2016), indicating that there is significant potential for researchers to understand the dynamics of agile ISD teams and examine the relationships between individuals, teams, and organizations. For example, Ågren et al. (2022) found that agile ISD teams face significant challenges regarding knowledge sharing in teams. ISD development is defined as knowledge-intensive work (Tiwana 2004), and agile practices emphasize the importance of collaboration and communication. Members of agile ISD teams are dependent on gaining and sharing knowledge appropriately. Hence, future research might explore the phenomenon of knowledge hiding and sharing in agile ISD teams and the effect on individual and organizational outcomes. Another potential direction for future research is the examination of team reflexivity, i.e., conscious reflection on the functioning of the team (Schipper et al. 2015).

Przybilla et al. (2018) found that agile ISD practices can positively influence team reflexivity and Krüger (2023) suggests that shared mental models are likely to influence team members’ reflexivity in agile ISD projects. Future studies might investigate the influence of team reflexivity on outcomes at the individual and organizational level. In addition, Prommegger et al. (2021) found that contextual variables might affect study planning, data collection, and analysis. Overall, given the importance of teamwork for individual and organizational outcomes, future research is suggested to acknowledge the nature of nested data. Hierarchical structural equation modeling and random coefficient modeling are conceivable methods in this context. We therefore ask the following: *What is the role of knowledge sharing and hiding in agile ISD teams? How does knowledge sharing and hiding affect individual and organizational outcomes? How does team reflexivity affect team members’ individual and organizational outcomes?*

6.4.5 Research Gap #10: Mixed Methods Research in Agile ISD - Proposed Research Direction: Applying a Mixed-Methods Approach

Qualitative research designs such as grounded theory can enable discoveries of inductive theory (Wiesche et al. 2017). When it comes to job satisfaction in agile ISD projects, a qualitative research approach might help to explore how team members in different roles perceive work and how this affects their job satisfaction. For example, Mueller and Toutaoui (2020) found in a qualitative approach that project managers in agile ISD teams differ from other team members in terms of roles, responsibilities, group membership, tasks, and activities. These differences might affect how job satisfaction is shaped. Future research is also encouraged to apply a mixed-methods procedure (e.g., Huck-Fries et al. 2022) and complement existing findings with a quantitative data set. Hence, we ask the following question: *Which insights on job satisfaction in agile ISD can we gain by the application of mixed-methods approaches?*

Tables 6, 7 provide an overview of constructs, research gaps, agenda for future research, research questions, benefits of answering the research questions and potential learnings. Figure 10 provides an overview of the theoretical contributions of this research (Table 8).

6.5 Implications for Existing Theory

This research contributes to existing theory in several ways. We extend previous work on job satisfaction and the JCM (Hackman and Oldham 1980) by introducing agile ISD as antecedents of job satisfaction. We confirm that core dimensions of work, such as skill variety and psychological states, such as perceived meaningfulness, can predict job satisfaction. However, we provide evidence on the complex interplay between agile ISD, moderators and job satisfaction and identify that core dimensions of work and psychological states can have a moderating role in the relationship between agile ISD and job satisfaction. We extend the JCM by proposing antecedents and moderating variables of job satisfaction.

Table 5 Overview of constructs, research gaps and description of research gaps in the literature

Construct	Gaps in the literature	Description of research gap
Antecedents	#1 Agile ISD practices	Existing literature on agile software development and project management practices Lack of insights into single agile practices that go beyond stand-up meetings (Stray et al. 2018) and pair programming (Balijepally et al. 2009)
Moderators	#2 Job characteristics in agile ISD	Evidence of the relationship between agile ISD and job satisfaction Lack of studies on further job characteristics (Tripp et al. 2016)
	#3 Role States in agile ISD	Existing findings on role ambiguity and role conflict Lack of evidence of the particular roles in agile ISD teams (Mueller and Toutaoui 2020), their interdependencies and their influence on job satisfaction
	#4 Leader relations in agile ISD	Predominantly studies on software developers and agile ISD teams Lack of studies on project managers (Mueller and Toutaoui 2020) and leadership (Modi and Strode 2020; Mueller et al. 2021) in agile ISD
Job Satisfaction	#5 Job Satisfaction in agile ISD	Existing studies on job satisfaction Lack of findings on less traditional work outcomes, such as job crafting (Tims et al. 2012)
Consequences	#6 Motivation and citizenship behavior in agile ISD	Studies on motivation and extra-role behavior Lack of studies on citizenship behavior in agile ISD (Parker et al. 2010)
	#7 Withdrawal cognitions in agile ISD	Lack of empirical evidence on agile ISD and voluntary turnover
	#8 Job performance in agile ISD	Evidence on predictors of job satisfaction Lack of findings on the influence of job satisfaction on ISD project success and job performance (Weinert and Weitzel 2023)
Higher-level constructs	#9 Group and Organizational States in agile ISD	Predominantly studies at the level of analysis of individuals Lack of in-depth insights into interdependencies between individuals, teams and organizations (e.g., by using three-level models, as proposed by Venkatesh et al. (2022))
	#10 Mixed methods research in agile ISD	Dominantly quantitative research designs Lack of methodological heterogeneity and a “theoretical core” (Tripp et al. 2018)

Table 6 Constructs, gaps in the literature and agenda for future research

Construct	Gaps in literature	Agenda for future research
Antecedents	#1 Agile ISD practices	Examining single agile ISD practices: <i>What is the effect of single agile ISD practices on team members' job satisfaction? How and why do retrospectives influence team members' job satisfaction?</i>
Moderators	#2 Job characteristics in agile ISD	Investigating the interplay between job demands and job resources: <i>What are team members' particular job demands and resources in agile ISD? How do agile practices change team members' job demands and resources? Can job resources buffer high job demands in agile ISD?</i>
	#3 Role States in agile ISD	Exploring the roles in agile ISD: <i>Which roles exist in agile ISD teams? How do role multiplexity and role identity tensions affect job satisfaction?</i>
	#4 Leader relations in agile ISD	Leading agile ISD teams: <i>How does emergent leadership influence team members' job satisfaction? How do different leader control styles and modes affect team members' job satisfaction? What is the effect of telework on leader control styles and modes in agile ISD teams?</i>
Job satisfaction	#5 Job Satisfaction in agile ISD	Going beyond traditional work outcomes: <i>What is the effect of agile ISD practices on team members' job crafting behavior? How do agile ISD practices affect workgroup embeddedness? Do work outcomes vary between different stages of the project?</i>
Consequences	#6 Motivation and citizenship behavior in agile ISD	Analyzing intrinsic motivation and extra-role behavior: <i>How do agile ISD practices affect team members' intrinsic motivation? What is the effect of agile ISD practices on extra-role behavior?</i>
	#7 Withdrawal cognitions in agile ISD	Determining voluntary turnover of IS professionals: <i>What is the effect of agile practices on perceived telework disparity and life-work conflict? How do these constructs affect voluntary turnover?</i>
	#8 Job performance in agile ISD	Studying project characteristics: <i>What is the effect of team members' job satisfaction on ISD project success? How do the results vary in large-scale ISD projects? How can inter-organizational ISD projects be successfully conducted?</i>
Higher-level constructs	#9 Group and Organizational States in agile ISD	Using the power of nested data: <i>What is the role of knowledge sharing and hiding in agile ISD teams? How does knowledge sharing and hiding affect individual and organizational outcomes? How does team reflexivity affect team members' individual and organizational outcomes?</i>
	#10 Mixed methods research in agile ISD	Applying a mixed-methods approach: <i>Which insights on job satisfaction in agile ISD can we gain by the application of mixed-methods approaches?</i>

Moreover, we reveal that job satisfaction has key consequences for employees' motivation, withdrawal cognitions, and job performance. Introducing consequences of job satisfaction goes beyond existing literature, such as the JCM and studies on agile ISD (e.g., Tripp et al. 2016).

By moving beyond the individual level and considering leader relationships, this work provides insights into the role of leadership culture and job satisfaction. We complement existing research on leadership in agile ISD, such as Venkatesh et al. (2023), by investigating self-leadership culture.

Additionally, we offer insights into the complex dynamics of group and organizational characteristics and job satisfaction. Our review of the literature reveals that the

public sector provides a particular work design setting, which enables a direct relationship between agile ISD and job satisfaction. Furthermore, cross-departmental communication teamwork quality, and the work environment have been identified as predictors of job satisfaction, which complements prior studies on the individual level (e.g., Weinert and Weitzel 2023).

6.6 Practical Contribution and Strategic Directions for the Use of Agile ISD Practices

Based on the systematic review of the literature on job satisfaction in agile ISD, we outline practical contributions and strategic directions for using agile practices in the

Table 7 Gaps in the literature, research questions and benefits of answering the research questions

Gaps in the literature		Research questions	Benefits of answering research questions
Antecedents	#1 Agile ISD practices	<i>What is the effect of single agile ISD practices on team members' job satisfaction? How and why do retrospectives influence team members' job satisfaction?</i>	Prove existing theoretical and practical (Highsmith 2002) claims about single agile ISD practices and job satisfaction Examine how the application of retrospectives might affect job satisfaction Develop guidelines for introducing, applying, and evaluating agile ISD in practice
	#2 Job characteristics in agile ISD	<i>What are team members' particular job demands and resources in agile ISD? How do agile practices change team members' job demands and resources? Can job resources buffer high job demands in agile ISD?</i>	Gain insights into the particular workplace design of agile ISD Contribute to existing research on job demands and resources in agile ISD (Huck-Fries et al. 2019; Rietze and Zacher 2022) Specify and define agile ISD demands and resources Contribute to existing theoretical discourse on the buffering role of job resources
	#3 Role States in agile ISD	<i>Which roles exist in agile ISD teams? How do role multiplexity and role identity tensions affect job satisfaction?</i>	Clarify role (in-)consistencies in agile ISD and contribute to the existing theoretical discourse (Huck-Fries et al. 2020; Maruping and Matook 2020; Mueller et al. 2021; Shastri et al. 2021) Provide insights into the phenomenon of role multiplexity among team members Clarify the effect of role identity tensions
	#4 Leader relations in agile ISD	<i>How does emergent leadership influence team members' job satisfaction? How do different leader control styles and modes affect team members' job satisfaction? What is the effect of telework on leader control styles and modes in agile ISD teams?</i>	Provide a foundation of emerging leadership in agile ISD teams and their potential effects on individuals' job satisfaction, contributing to existing research (Biehler et al. 2022) Provide empirical insights on the effect of leader control styles and control modes on team members' job satisfaction Offer empirical insights on the effect of telework on leaders' control styles and modes Provide insights for practitioners to lead agile ISD teams in times of hybrid work
Job Satisfaction	#5 Job Satisfaction in agile ISD	<i>What is the effect of agile ISD practices on team members' job crafting behavior? How do agile ISD practices affect workgroup embeddedness? Do work outcomes vary between different stages of the project?</i>	Gain insights on the interdependencies between agile ISD and job crafting, contributing to the existing theoretical discourse on occupational well-being in agile ISD (Benlian 2022; Rietze and Zacher 2022) Explore the mechanisms between agile ISD and workgroup embeddedness Prove existing empirical evidence on the variability of work outcomes between different stages of the iteration or project (Benlian 2022; Tuomivaara et al. 2017)
Consequences	#6 Motivation and citizenship behavior in agile ISD	<i>How do agile ISD practices affect team members' intrinsic motivation? What is the effect of agile ISD practices on extra-role behavior?</i>	Gather empirical evidence on the underexamined role of intrinsic motivation in agile ISD, contributing to existing research on intrinsic motivation (Thatcher et al. 2006) Explore extra-role behavior in agile ISD Examine how variations between and within individuals might affect their intrinsic motivation

Table 7 continued

Gaps in the literature		Research questions	Benefits of answering research questions
#7 Withdrawal cognitions in agile ISD	<i>What is the effect of agile practices on perceived telework disparity and life-work conflict? How do these constructs affect voluntary turnover?</i>	Contribute to existing debates on voluntary turnover of IS professionals (e.g., Setor and Joseph 2022)	
		Support (or reject) empirical evidence on the relationship between job satisfaction and voluntary turnover	
#8 Job performance in agile ISD	<i>What is the effect of team members' job satisfaction on ISD project success? How do the results vary in large-scale ISD projects? How can inter-organizational ISD projects be successfully conducted?</i>	Clarify the role of perceived telework disparity and life-work conflict	
		Provide empirical evidence on the ambiguous effect of job satisfaction and ISD project success, contributing to existing debates (Weinert and Weitzel 2023)	
		Prove existing claims on job satisfaction and project success	
		Provide evidence on job satisfaction in large-scale ISD	
Higher-level constructs	#9 Group and Organizational States in agile ISD	Develop guidelines for the application of agile ISD within large-scale ISD and inter-organizational ISD	
		<i>What is the role of knowledge sharing and hiding in agile ISD teams? How does knowledge sharing and hiding affect individual and organizational outcomes? How does team reflexivity affect team members' individual and organizational outcomes?</i>	Clarify the role of knowledge sharing and hiding in agile ISD teams
			Prove the influence of team reflexivity on work outcomes, contributing to existing research (Przybilla et al. 2018)
	#10 Mixed methods research in agile ISD		Gather in-depth empirical evidence on team and organizational characteristics of agile ISD
		<i>Which insights into job satisfaction in agile ISD can we gain by the application of mixed-methods approaches?</i>	Offer theory-grounded empirical evidence on agile ISD Complement existing quantitative and qualitative research

following. Figure 11 provides an overview of strategic directions for the use of agile ISD practices.

6.6.1 Agile ISD as a Work Design Tool

The review of the literature found that agile ISD practices fundamentally change job characteristics. When introducing and applying agile ISD practices, organizations and HR managers should be aware of the fact that employees face an important change process. The process itself should be supported with change management tools, training, and continuous reflection on the organizational side.

Recommendation #1: Consider agile practices as a powerful tool for work design.

6.6.2 Agile ISD to Influence Turnover

Overall, the literature indicates that agile ISD practices are positively related to employees' job satisfaction. Facing the direct influence of job satisfaction on key organizational outcomes, such as voluntary turnover, project performance, and innovative behavior, it is important for organizations to gain and retain satisfied employees. Particularly the software industry suffers from a lack of qualified employees and is struggling to gain and retain professionals. Agile ISD practices can act as a powerful tool to manage employees' job satisfaction and, as a result, their intention to stay in the organization. However, organizations should be aware that agile ISD practices do not guarantee more satisfied employees.

Recommendation #2: Use agile practices as a tool to gain and retain qualified employees.

6.6.3 Agile ISD and Leading Teams

Employees' job satisfaction is significantly affected by leaders and their leadership styles. Often, organizations face challenges in leading agile teams because of the fundamental differences between leading traditional and agile teams. While leadership in traditional teams is characterized by a “command and control style” and definition of rules and goals (Nerur et al. 2005), leadership in agile teams requires adaptation and the crafting of processes in order to fulfill collective rules and goals (Augustine 2005). Hence, when leading agile teams, organizations can support leaders and project managers in acquiring leadership skills and properly defining their roles. Mentoring, training, and coaching activities might be useful tools to support leaders in their roles. As well, agile coaches, i.e., experts of agile ISD that support organizations and teams in applying agile practices, can be useful for both leaders and teams. They could support both leaders and team members in adapting to agile leadership.

A particular focus should be given to heterogeneity in agile teams. The agile team consists – per definition – of members with a broad skill set (Tripp et al. 2016), which makes it essentially different from a traditional ISD team that is usually specialized according to functions (e.g., testing, development) (Nerur et al. 2005). Given the nature of ISD, which is commonly defined as knowledge-based, agile teams might particularly benefit of a heterogeneous composition regarding education, age, gender, and race.

Recommendation #3: Provide professional support for leaders of agile teams.

6.6.4 Agile ISD and Agile Maturity

An organization's agile maturity is critical to successfully adopting agile practices and using them as a tool to influence employee job satisfaction. For organizations, it might be worthwhile to self-assess their agile maturity ex-ante and ex-post using a self-assessment tool). In this way, organizations can determine their degree of agile maturity and, if necessary, derive strategic changes, and adaptations of existing business processes.

Recommendation #4: Use a self-assessment tool to determine an organization's agile maturity.

6.6.5 Agile ISD and Remote Work

Since the beginning of the global COVID-19 pandemic, organizations have been required to send their employees home to work remotely. For members of agile teams, remote work can be fostering and challenging at the same time. On the one hand, agile ISD emphasizes a high amount of collaboration and requires continuous communication between team members. For example, daily stand-ups are commonly practiced, and iterative delivery and retrospectives are held at the end of each iteration. This enables team members to continuously stay in touch, contributing to teamwork quality and team success factors, such as team cohesion. On the other hand, the amount of

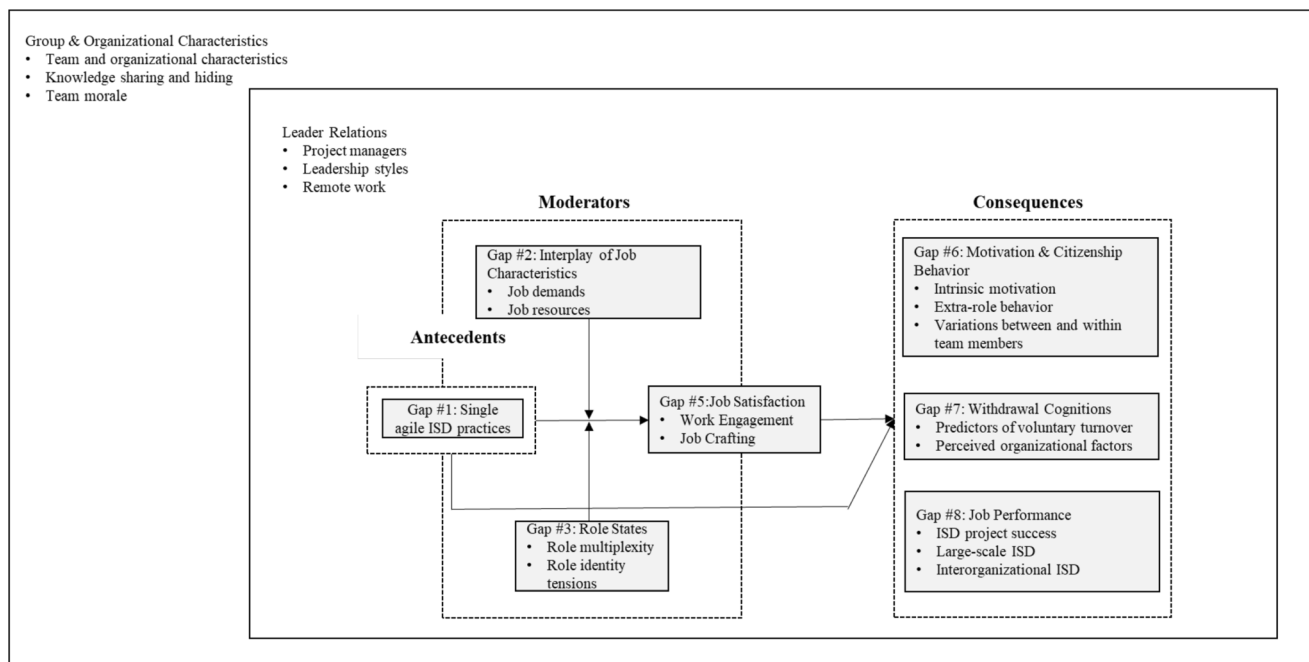


Fig. 10 Overview of theoretical contributions of this research

Table 8 Proposed research directions and potential learnings

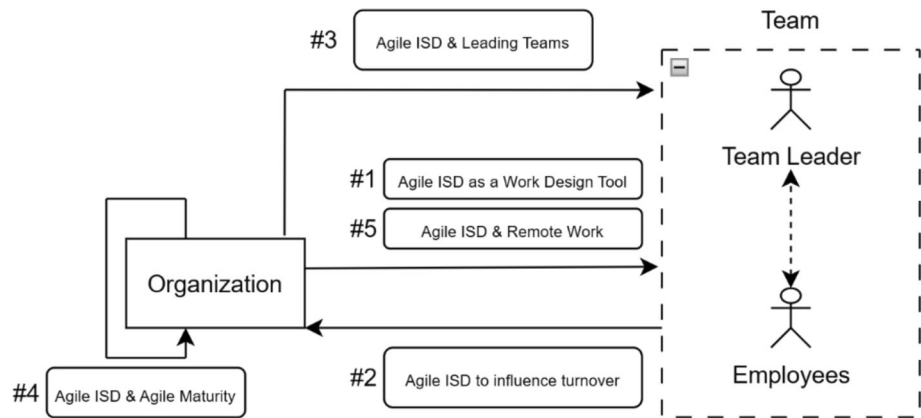
Proposed research directions		Potential learnings
Antecedents	#1 Agile ISD practices	Certain agile ISD practices may foster team members' job satisfaction, while others might diminish it The application of retrospectives is supposed to positively affect job satisfaction
Moderators	#2 Job characteristics in agile ISD	Agile ISD practices may place particular demands on team members, such as self-regulation, fatigue, interruptions and informal communications Agile ISD practices may provide key resources for team members, such as learning spirit, empowered self-guidance and social support Resources in agile ISD might buffer high demands at work, enabling team members to effectively cope with varying demands
	#3 Role States in agile ISD	Perceptions of role multiplexity are not only subject to project managers (Maruping and Matook 2020), but might occur with all members of the agile ISD team and potentially negatively affect their job satisfaction Perceptions of role identity tensions (Mueller et al. 2021) may have a negative influence on job satisfaction
	#4 Leader relations in agile ISD	A classification of emergent leadership styles in agile ISD can be provided The phenomenon of emergent leadership may positively and negatively affect both team members' and leaders' job satisfaction Leader control modes and leader control styles may have an influence on team members' job satisfaction, enabling to provide practical guidelines for leading agile ISD teams
	#5 Job Satisfaction in agile ISD	Agile ISD might foster employees' job crafting behavior in the manner that it enables autonomous and self-organizing work design and successful task completion. Team members might perceive less avoidance-oriented job crafting and a higher amount of approach-oriented job crafting Team members might perceive more embeddedness into the workgroup caused by the application of agile ISD practices Team members' work outcomes might vary between different stages of the project. For example, they might perceive a high amount of job crafting at the beginning of the iteration, while it might decrease at the end due to limitations of time
Consequences	#6 Motivation and citizenship behavior in agile ISD	Agile ISD practices might foster intrinsic motivation for certain team members, while it might diminish it for others Agile ISD practices might affect extra-role behavior in the manner that agile ISD influences change-related processes
	#7 Withdrawal cognitions in agile ISD	We might provide evidence for a u-shaped relationship between job satisfaction, perceived telework disparity, life-work conflict and voluntary turnover in agile ISD
	#8 Job performance in agile ISD	Job satisfaction might be identified as a mediating variable of the relationship between agile ISD and ISD project success These findings might vary in large-scale ISD projects and inter-organizational ISD
Higher-level constructs	#9 Group and Organizational States in agile ISD	Agile ISD might foster knowledge sharing, which might increase job satisfaction Agile ISD might enhance team reflexivity, which is supposed to affect job satisfaction on the individual level
	#10 Mixed methods research in agile ISD	Existing qualitative or quantitative evidence might be extended by the use of a mixed-methods procedure

collaboration and communication held virtually might be overwhelming for team members. Virtual meetings place certain demands on users and might contribute to cognitive overload and depletion of resources. Also, the literature indicates that voluntary and forced remote work have different effects on job satisfaction and employee well-being (Ågren et al. 2022).

Recommendation #5: Offer (and not force) members of agile teams to work remotely.

7 Conclusion

Agile ISD practices become increasingly popular among organizations (Digital.ai 2022). To a great extent, this

Fig. 11 Strategic directions for the use of agile ISD practices

popularity is based on the claim that agile ISD practices increase team members' job satisfaction (Highsmith 2002). In this research, we set out to analyze the current state of the literature on this claim. In order to gain appropriate insights on job satisfaction in agile ISD, we (a) systematically review and critically evaluate the status quo in the intra- and interdisciplinary literature, (b) conceptualized a theoretical framework consisting of three key themes, (c) identified significant research gaps and (d) provide strategic implications for the use of agile practices in organizations. Overall, this literature review supports the claim of the agile manifesto and is thought to be a starting point for future promising, exciting, novel, and practically relevant research.

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