Check for updates

Do Agile Managed Information Systems Projects Fail Due to a Lack of Emotional Intelligence?

Tan Trung Luong[1] · Uthayasankar Sivarajah[1] · Vishanth Weerakkody[1]

© The Author(s) 2019

Abstract

Agile development methodologies (ADM) have become a widely implemented project management approach in Information Systems (IS). Yet, along with its growing popularity, the amount of concerns raised in regard to human related challenges caused by applying ADM are rapidly increasing. Nevertheless, the extant scholarly literature has neglected to identify the primary origins and reasons of these challenges. The purpose of this study is therefore to examine if these human related challenges are related to a lack of Emotional Intelligence (EI) by means of a quantitative approach. From a sample of 194 agile practitioners, EI was found to be significantly correlated to human related challenges in agile teams in terms of anxiety, motivation, mutual trust and communication competence. Hence, these findings offer important new knowledge for IS-scholars, project managers and human resource practitioners, about the vital role of EI for staffing and training of agile managed IS-projects.

Keywords Agile · Information systems · Project management · Emotional intelligence

1 Introduction

Since the introduction of Agile development methodologies (ADM), organizations have been fascinated by its potential to engage stakeholders, adapt to changing requirements and quickly deliver software (Cram 2019). Consequently, ADM is now the mainstream information systems (IS) project management method of choice worldwide (Hoda et al. 2018) with 97% of organizations reporting to practice them (VersionOne 2018). ADM offer disciplined, yet lightweight processes while placing human effort and experience at the core through its central focus on people and interactions (Hoda et al. 2018). Therefore, the importance of the people factor for the success of ADM projects has been constantly highlighted in the scholarly literature (Cockburn and Highsmith 2001; Boehm and Turner 2005; Moe et al. 2012; Fortmann 2018; Cram 2019) and it has been repeatedly identified as critical success factor for ADM managed projects (Lindvall et al. 2002; Chow and Cao 2008; Pedersen 2013; Kalenda et al. 2018). Recognizing the importance of the people factor, scholars have made considerable effort to examine human related challenges that occur in agile teams. They reported challenges related to recruitment, training, motivation and performance evaluation (Conboy et al. 2011) or effective communication, social interaction and motivation (Lalsing et al. 2012). However, exploring the primary origins and reasons of these challenges has received less effort (Javdani Gandomani and Ziaei Nafchi 2016) and therefore remains vague.

Yet, if human aspects are neglected, there is a risk of the results that are produced do not uncover key factors for determining the success or failure of software projects (Lenberg et al. 2015). A construct that might be related to these reported challenges and that has been neglected so far is Emotional Intelligence (EI). Emotions grow out of social interactions and are thus fundamental how team members interact and work together (Barczak et al. 2010). Hence, EI has been found to be positively related to important domains, such as improved communication (Ciarrochi and Mayer 2013), job performance and leadership effectiveness (Côté 2017) or team performance (Macht et al. 2019). Yet, empirical research on EI of IS-professionals is scant (for exceptions, see Kosti et al. (2014); Ahmad Marzuki et al. (2015); Rezvani and Khosravi (2019)). As a consequence, the study of psychological aspects in ADM remains a quite new research field (Thorgren and Caiman 2019).

✉ Tan Trung Luong
  T.T.Luong@bradford.ac.uk

  Uthayasankar Sivarajah
  U.Sivarajah@bradford.ac.uk

  Vishanth Weerakkody
  V.Weerakkody@bradford.ac.uk

[1]   University of Bradford, Richmond Road, Bradford BD7 1DP, UK

🍀 Springer

The purpose of this study is to examine how the EI of IS-professionals influences the success of ADM-projects. The research question it endeavors to answer is whether human related challenges that IS-professionals perceive when working in agile managed teams are related to a lack of their EI. Hence, this study contributes to information systems, project management, organizational, psychology and human resources research. It introduces EI as so far neglected critical success factor to the ADM literature. The findings of this study will significantly improve the staffing and training of agile team members.

2 Literature Review

2.1 Plan-Driven Development Methodologies

Early project management methodologies are driven by a project plan, which includes predefined project stages (Cooper 2014). The project stages are executed sequentially, whereas each stage is only executed once (Robson 2013). Consequently, these approaches are referred to as plan-driven project management methodologies (Goodpasture 2010) or waterfall-models (Cooper and Sommer 2016; Pedersen 2013). Plan-driven project management methodologies are characterized by their reliance on written documentation, extensive front-up planning, up-front customer involvement and a more formal, command-and-control oriented management structure (Cram 2019).

Many authors have alluded on the pitfalls of plan-driven methodologies. An often highlighted disadvantage is that they are inflexible to cope with changes (Cobb 2011; Cooper 2014), i.e. they assume that the full scope of requirements can be certainly assessed in advanced and that an optimal and predictable solution exists for every problem (Dybå and Dingsøyr 2008). Furthermore, they assume that projects exist isolated from their environment and their emphasize on robustness of the plan has thus been criticized to not properly respond to the increasing complexity and dynamic of today's projects (Radujković et al. 2014). Another drawback is that too much time is wasted with documentation and client collaboration starts too late (Mandal and Pal 2015). Being confronted with increasing problem complexity and rapid changing requirements, software developers hence started to realize that an alternative project management approach is needed (Kakar 2017).

2.2 Agile Project Management

As response to these plan-driven methodologies, ADM emerged in the late 1990s (Hoda et al. 2018). The aim of ADM is to enable project management to sustain in an unpredictable world (Dybå and Dingsøyr 2008), by facilitating customer involvement, continuous software design and flexible scope (Serrador and Pinto 2015). In contrast to plan-driven teams, where team members execute only their assigned tasks within their specified roles, such as business analyst or programmers, agile teams organize themselves (Kakar 2017). ADM apply an iterative process, where in each iteration, the team plans, analyzes, designs, codes, and tests to achieve defined goals without being driven by a sequential plan (Thorgren and Caiman 2019).

Empirical studies have indicated that applying ADM is positively related to project success, in terms of efficiency and overall stakeholder satisfaction (Serrador and Pinto 2015), that they enable developers to produce higher quality software (Tan and Teo 2007; Schmidt et al. 2014) and also enable companies to achieve their targets in decreasing lead times and improving the quality of their products (Minna Pikkarainen et al. 2012). Though, ADM place great trust on individuals (Goodpasture 2010). Not only that they demand agile teams to be able to work in a self-managed way, but also to possess the required mix of technical and business, as well as behavioral knowledge (Goh et al. 2013). Consequently, for many agile team members it is not easy to adapt to agile practices, because they might feel uncomfortable with the increased social interaction or being exposed with a lack of sufficient business knowledge (Conboy et al. 2011). Also, self-organizing teams struggle, when they are meant to take over and share project management tasks as estimation, planning and requirement elicitation (Hoda and Murugesan 2016). As a dilemma, ADM thus require a premium on people and their interactions (Vinekar et al. 2006), if not the best available (Radujković et al. 2014). Therefore, as provokingly stated by Lalsing et al. (2012), agile looks great on paper, but will fail to succeed in reality, if human psychology is not understood and taken into account.

2.3 Conceptualization of Emotional Intelligence

Being dissatisfied with the narrow conceptualization of human intelligence and its focus on verbal, performance or academic abilities (Ciarrochi et al. 2000), a notable group of scholars (Bar-On 1997; Mayer and Salovey 1997; Petrides and Furnham 2001) focused on the relation between emotions and intelligence, i.e. the conceptualization of EI as a new distinct form of intelligence. Though, scholars are not aligned whether non-cognitive competencies, such as motivation, personality or temper should be part of EI or not (Cho et al. 2015), which resulted in considerable confusion and misunderstanding (J. D. Mayer et al. 2008). Although, emotions have become a central topic of research in the past 30 years in several domains of psychological science, disparate approaches to define and measure EI have still produced rather inconsistent findings (Schlegel and Mortillaro 2019). Yet, most scholars agree that the EI approaches can be classified into two broad

categories: ability-based or mixed-based models (Rosete and Ciarrochi 2005; Cho et al. 2015; Iliceto and Fino 2017; Mattingly and Kraiger 2019).

Ability-based models have their origin in the Four-Branch model of EI conceptualized by Mayer and Salovey (1997), including the branches: perceiving emotions, facilitating thought by using emotions, understanding emotions and managing emotions in oneself and others. Each branch represents a group of skills that proceeds developmentally from basic tasks to more challenging ones Mayer et al. 2016). Mayer et al. (1999) argued that EI can only meet the stringent criteria of true intelligence, if it is defined as a set of abilities of mental performance rather than just preferred ways of behaving. In their view, intelligence has to be distinguished from personality, because intelligence involves organismic abilities to behave, whereas personality traits involve dispositions toward behavior (Mayer and Salovey 1993).

In contrast to ability-based models, mixed-based models of EI include in addition to emotional abilities, a constellation of non-cognitive competencies, such as motivation, personality, temperament or character and social skills (Schutte et al. 2013; Cho et al. 2015). Having so many additional independent qualities, mixed EI models have been criticized to be weak from a construct validity point (Mayer et al. 2008) due to their unknown content and theoretical value (Joseph and Newman 2010). This research will thus follow the concept of ability EI rather than mixed EI.

2.4 How Should EI be Assessed?

Despite of advances in the conceptualization of EI, there is still limited understanding of the psychometric properties of existing EI measures (Cho et al. 2015). The controversy starts with attempting to classify the different assessment methods into different categories. Petrides and Furnham (2001) proposed a simplistic classification to either testing ability or trait EI, based on either to be measured via self-report or performance based tests. However, researchers should pay attention to distinct between construct and method (Arthur and Villado 2008). Hence, both the underlying model of an EI assessment tool and its assessment method should be used as distinction (Joseph and Newman 2010). Current measures of EI can therefore be organized in three streams (Lopes 2016; Schlegel and Mortillaro 2019), which are depicted in Fig. 1.

As illustrated by Lopes (2016), the first stream is based on ability models and applies performance-based assessment. The second stream is also based on ability models, but utilizes self-report assessment. The third stream is based on mixed models and relies on self-report assessment. As mentioned above, this research will follow the concept of ability EI and thus self-report mixed EI assessment tools have been excluded from further discussion.
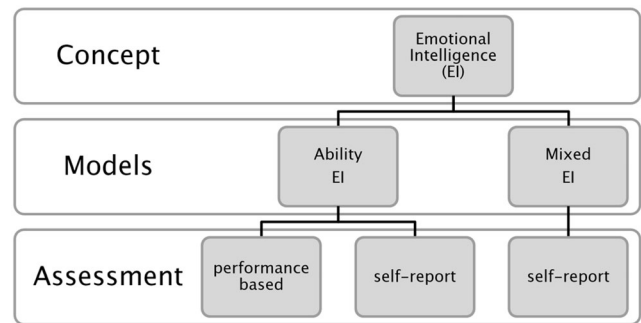

Fig. 1 Concepts, models and assessment method for EI (source: author)

2.4.1 Ability EI Assessed Performance-Based

Some scholars argue that that EI is best measured as ability, because people are poor at estimating their own levels of intelligence and therefore they estimate their abilities based on other bases, such as self-confidence or self-esteem (Mayer et al. 2016; Schlegel and Mortillaro 2019). The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) is still the only performance-based ability assessment tool (Macht et al. 2019). Yet, there is also no consensus among experts in regard to the evaluation of the responses of this test (Carvalho et al. 2016). The challenge is to determine objective correct responses (Roberts et al. 2001). In particular, cultural context might affect people's emotions and it is thus not certain if a measurement developed within a specific cultural setting can also applied in another cultural setting (Law et al. 2008; Lee and Kwak 2012). Another drawback of the MSCEIT is the considerable amount of time to complete the 141 items and the high costs of its application (Carvalho et al. 2016). Thus, measuring EI as an ability remains a big challenge (Lopes 2016).

2.4.2 Ability EI Assessed Self-Reported

One of the most frequently administered ability EI self-report assessment tools is the Wong and Law Emotional Intelligence Scale (WLEIS). The initial motivation to develop the WLEIS, was the need for a simple, practical, and psychometric sound measure of ability EI that can be used for organizational research purposes, i.e. that can be applied on the workplace (Wong and Law 2002). The WLEIS has many advantages, such as the fact that it is relatively short, including only 16 items, designed to be applied on working population, free to administer and described to be relatively independent of personality traits (Ng et al. 2007; Brannick et al. 2009). Current research indeed supports the cross-cultural generalizability of the WLEIS (Libbrecht et al. 2014; Carvalho et al. 2016; Iliceto and Fino 2017) and there is evidence that it is a predictor for job performance (Wong and Law 2002; Law et al. 2008; Trivellas et al. 2013; Chen et al. 2015).

2.5 Artificial Emotional Intelligence as Neglected Component of Artificial Intelligence

Although, Artificial Intelligence (AI) technologies have evidently demonstrated how they enhance our lives, e.g. smartphones, online shopping services and how business connect with and understand customers, many challenges remain to be met, for AI to take off with all on board (Helal 2018). According to Rossi (2018), the current research in AI focus on two main areas. One is based on rules, logic and symbols. The other area of research is based on examples, data analysis and correlation and can be applied in cases where there is an incomplete definition of the problem to be solved. However, when it comes to AI, emotions are not usually the first thing that comes to mind (Schuller and Schuller 2018). Yet, understanding how people solve problems in the area of emotions is essential for computer systems and robots to emulate human reasoning (Mayer et al. 2016). Consequently, all tasks requiring EI are still beyond the reach of AI systems (Brynjolfsson and Mitchell 2017). Therefore, developing Artificial Emotional Intelligence, in particular the ability to recognize emotions and then respond appropriately, is essential to the true success of digital assistants we interact with every day, such as Apple's Siri or Google's Alexa (Krakovsky 2018).

3 Conceptual Model and Hypotheses Development

3.1 Anxiety Caused by Agile Practices

Individuals can experience negative psychological states, such as anxiety, because they ineffectively interpret emotional stimuli, set inappropriate goals, implement ineffective coping strategies or fail to employ appropriate emotion regulation skills (Thomas et al. 2017). For this research, anxiety is defined as "a negative psycho-emotional state that results when fear of events, which are not always identifiable, manifests as an exaggerated response where nervousness and worry predominate" (Castro-Sánchez et al. 2019).

This also applies to IS-professionals, as they encounter numerous obstacles in their effort to successfully complete their assigned tasks and these challenges increase levels of stress, which subsequently affect their ability to self-regulate their feelings and understanding (Rezvani and Khosravi 2019). For example, some agile team members experience fear that is caused by the transparency of their skill deficiencies, because agile practices, such as daily stand-up meetings, onsite customers or the use of storyboards require direct and constant communication and collaboration (Conboy et al. 2011). Similar cases have been reported by Lalsing et al. (2012), where team members did not raise concerns regarding their technical deficits in order to avoid revealing that they

were technically behind other team members. Furthermore, many developers feel a strong temptation to always say "yes" to avoid appearing less competent than other team members, even if they know that they cannot deliver a certain task in a given time (Kovitz 2003). Furthermore, some agile team members, particularly junior team members, might feel scared to make estimates, velocity or product backlog, because they are afraid to be perceived as incompetent for potentially making wrong estimates (Dorairaj et al. 2012). It has also has been pointed out that agile team members might even try to avoid arguing in order to conform to other team members, although this behavior is preventing effective decision-making (Moe et al. 2012). In addition, agile team members might also feel worried about adapting to the new agile methodology, i.e. that they might feel unsecure whether they can adapt adequately to this new methodology and having concerns, about how other team members might judge them (Javdani Gandomani and Ziaei Nafchi 2016).

The ability to regulate one's own emotions can decrease undesired emotional impact on job performance, i.e. people can rise above negative perceptions quickly and thus their performance will be impacted less (Law et al. 2008). For example, when spiked by aggressive customer behavior, being able to regulate emotions is important to the long term health and retention of IS-professionals (Shih et al. 2014). Individuals with this ability also present a wider repertoire of strategies for maintaining positive emotions and for reducing or modifying negative emotions (Martínez-Monteagudo et al. 2019). Furthermore, this ability has also been found to buffer the impact of cognitive text anxiety in academic achievements (Thomas et al. 2017). Consequently, following hypothesis is proposed:

> **H1a.** The ability to regulate one's own emotions is negatively associated with anxiety perceived by agile team members.

3.2 Motivation to Apply Agile

Motivation is recognized as a key success factor for software projects (Sharp et al. 2009) and hence low motivation can cause failure of software engineering endeavors (Pankratz and Basten 2017). For this research motivation is defined as "initiation, direction, intensity and persistence of behavior" (Sharp et al. 2009). On the one hand, recent studies indicate that motivation of agile teams is even significant higher than of plan-driven teams (Kakar 2017). They argued that this is due to self-organization, which is positively related to motivation because it stimulates greater team member involvement and participation, resulting in higher commitment and motivation. On the other hand, motivation has also been increasingly cited as a particularly pernicious people problem in

software engineering (Sharp et al. 2009). For example, Conboy et al. (2011) reported that some agile team members perceived the adoption of agile methods as overly onerous, complex and time-consuming. Although, possessing the competence, they were not convinced that agile will work and hence lacked motivation to apply agile practices. This was particularly prominent in companies that adopted agile methods top-down. A lack of enough motivation can also be a hidden reasons why some agile team members are indifferent to adopt agile methods in their organizations (Javdani Gandomani and Ziaei Nafchi 2016). Another aspect has been highlighted by Lalsing et al. (2012), who reported that agile team members might suffer from motivation issues, when tasks are assigned to them that they do not perceive as challenging enough.

Law et al. (2008) associated motivation with the ability to use emotions to facilitate performance. They argued that people with strong learned goal-seeking behaviors are able to make use of their emotions in order to direct their behaviors to achieve their goals. In a similar vein, Mayer et al. (2016) stated that EI includes the ability to facilitate thinking by drawing on emotions as motivational and substantive inputs. In regard to team EI, Barczak et al. (2010) stated that teams with higher EI are better to inspire support and confidence in fellow team members. As a result, following hypothesis is proposed:

> **H2a.** The ability to use emotions is negatively associated with motivation challenges of agile team members.

Teams with higher ability to monitor and regulate their emotions are more likely to motivate themselves (Barczak et al. 2010). Similarly, research revealed that individuals with higher perceived ability to regulate their emotions are more likely to report being motivated by achievement needs (Christie et al. 2007). In line with this, below hypothesis is proposed:

> **H2b.** The ability to regulate emotions is negatively associated with motivation challenges of agile team members.

3.3 Communication Competence in Agile Teams

In ADM projects, close and frequent communication among team members substitutes predetermined plans, such as used in traditional management approaches (Thorgren and Caiman 2019) and therefore hurdles in communication can in turn have a negative impact on the efficiency of agile practices (Pikkarainen et al. 2008) and several dependant functionalities, such as the communication of requirements or queries (Lalsing et al. 2012). The importance of communication competence throughout the entire ADM project has thus been highlighted by many scholars (Lalsing et al. 2012; Hummel et al. 2013; Ghobadi and Mathiassen 2016). Likewise, Pedersen (2013) shed light on the importance of communication with the client as it continues throughout the development process. For example, customers are given demonstrations of solution after each iteration and their feedback is used as the basics for the next course in action. Great emphasis is also placed on communication involving diverse stakeholders through practices such as joint-application design sessions and customer focus groups (Ghobadi and Mathiassen 2016). This research has chosen a definition of communication competence proposed by McCroskey (1988) as "adequate ability to pass along or give information; the ability to make known by talking or writing".

In ADM projects, knowledge is considered to be social constructed and collectively held and verbal communication is considered to be more effective in sharing concepts, ideas or desires, because it allows rapid mutual feedback and also stimulate further thinking, by transforming and reshaping thoughts and drawing new implications from them (Melnik and Maurer 2004). Hence, agile practices mainly rely on face to face conversations between team members to communicate rather than just source code (Kovitz 2003) and they are therefore shifting communication from the traditional paradigm, including documentation, plans and models towards more informal communication (Hummel et al. 2013). In the same vein, Begel and Nagappan (2007) pointed out that within an agile context social cliques may become the dominant means of communication and that those with poor interpersonal skills might be excluded from these cliques and thus from important communication as well.

Yet, in order to successfully transfer tacit knowledge, the agile team members need to possess a multitude of characteristics, such as empathy and the ability to articulate and communicate enough (Takpuie and Tanner 2016). However, IS-professionals have been reported to be an introverted personality type (Beecham et al. 2008; Hendon et al. 2017), who enjoys working alone and may get overwhelmed with too much social interactions (Sharp et al. 2009; Shih et al. 2014). They have also been characterized to have no desire to interact with customers (Shih et al. 2014) and who typically have difficulties in communicating because their actions are based on what they think rather than on what somebody else feels (Capretz 2003). Yet, whenever team members work together, emotions grow out of social interactions and thus have a pervasive influence in establishing a collaborative environment, where team members are encouraged to embrace change and to openly share and discuss their individual viewpoints, share knowledge and learn from each other (Barczak et al. 2010). Furthermore, emotions convey information and therefore function as communication signals, such as happiness is a signal of wanting to join with others or sadness is a signal of loss and wanting of comfort (Mayer et al. 2008).

Therefore, scholars have shed light on the relation between EI and communication competence, such as effective communication requires the management and recognition of one's own and others' emotional expression (Troth et al. 2012a) or the ability to understand emotions contributes to developing communication skills (Petrovici and Dobrescu 2014). In a similar vein, George (2000) argued that in order to effectively communicate with other people about one own needs and concerns it is necessary to accurate appraise and express emotions of one's self and others'. Consequently, the following hypotheses are proposed:

> **H3a.** The ability to appraise and recognize emotions in one's self is negatively associated with communication challenges.
>
> **H3b.** The ability to appraise and recognize emotions in others is negatively associated with communication challenges.
>
> **H3c.** The ability to regulate emotions is negatively associated with communication challenges.

3.4 Mutual Trust as Key Factor for Team Performance

Mutual trust is one of the most influential key factors in regard to agile team performance (Lalsing et al. 2012) and a predictor for project performance and project effectiveness (Rezvani et al. 2016). For this research, trust will be understood as "a psychological state comprising of the intention to accept vulnerability based upon positive expectations of the intentions of behaviours of another" (Rousseau et al. 1998). Yet, trust can be challenging in agile teams. For example team members might be reluctant to assign certain tasks to other team members, because they have concerns if they can accomplish them in an effective manner and on time and thus assign the tasks to themselves and as a consequence cause delays in other areas (Lalsing et al. 2012). Likewise, Henttonen and Blomqvist (2005) argued that trust is an important component in team development and effectiveness, because team members are less willing to contribute and cooperate if there is a lack of trust. In particular, at the start of a project, a lack of familiarity between the team members can be an impediment for collaboration and communication (Lalsing et al. 2012). Another aspect that impedes the building of trust are cultural issues (Javdani Gandomani and Ziaei Nafchi 2016). As illustrated by Dorairaj et al. (2012), cultural differences include the accent and rapidness of verbal communication, body language and also actual meaning for the spoken word. For example, words might have different meanings in different cultures. Replying with "yes" by an Indian team member might mean "Yes, I heard you." However, an American team member might perceived it as "Yes, it is done". This lack of cultural understanding impedes significantly the building of trust and bonding among the team members.

In fact, as stated by Barczak et al. (2010) team trust is mainly build on both, emotional bonds and perceived competencies of individual team members. They argued that when team members manage their own emotions and those of their peers, they are more likely to be trusted and relied on for their competence and ability. Besides, when team members are aware of their own emotions they can easier emphasize with their peers and provide support and consequently creating more team trust. Accordingly, below hypothesis can be formulated:

> **H4a.** The ability to regulate emotions is negatively associated with mutual trust challenges.
>
> **H4b.** The ability to appraise and recognize emotions in one's self is negatively associated with mutual trust challenges.
>
> The ability to appraise and recognize other people's emotions assist in being accepted by others, earning their trust and gaining their collaboration (Law et al. 2008). As a result, below hypothesis can be formulated:
>
> **H4c.** The ability to appraise and recognize other people's emotions is negatively associated with mutual trust challenges.

An overview of the nine proposed hypotheses is presented in the conceptual model in Fig. 2. The purpose of this research is to examine causal inferences between EI and human related challenges perceived by agile team members.

4 Research Methodology

4.1 Indicating Causal Inference

One of the most repeated mantras in social science is that "correlation does not imply causation" (Box-Steffensmeier 2007). In order to imply that changes of one variable causes changes in another variable, research design needs to ensure that their relationship is not spurious, i.e. that there are no unaccounted causes making the original variables just to appear to be correlated (Abbott and McKinney 2013). The failsafe to ensure nonspuriousness is to use randomized experiments, because if the individuals were randomly assigned to the treatments, the baseline characteristics, also referred to as covariates, on average are approximately equal (Antonakis et al. 2010). However, randomisation is often unethical or just not feasible (Russo et al. 2011). In social science, most studies are therefore designed based on non-experimental design and observational data, as the studied objects can often not be randomly exposed to the event (Tsapeli and Musolesi 2015).
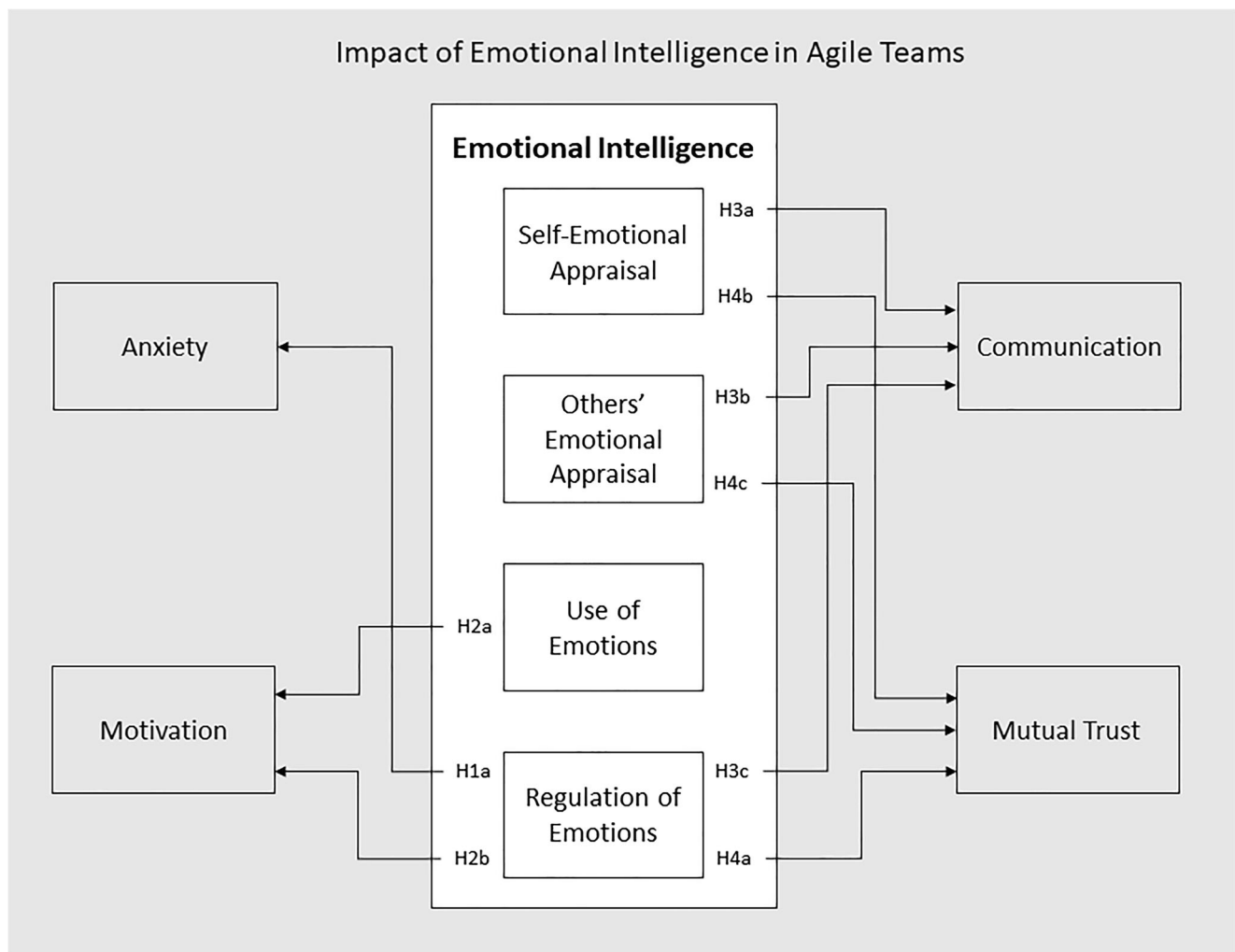
Fig. 2 Proposed conceptual model "Impact of Emotional Intelligence in Agile teams" (source: author)

4.2 Propensity Score Matching

A framework for quasi-experimentation has first been formalized by Rubin (1974). Rubin's Causal Model (RCM) is a model with a compact and precise conceptualization of causal inference, which includes the three key elements: units, treatment and potential outcomes (Shadish 2010). In order to reduce bias, the treatment units have to be matched with the most similar control units (Tsapeli and Musolesi 2015), e.g. by applying propensity score matching (PSA). PSA is a mathematical approach that utilizes the participant's probability to be assigned to a group to balance the participants between the groups (Forrest 2012). This probability is calculated based on a propensity score, which is the probability of being treated, by summarizing the covariates into one single scalar (Stuart 2010).

PSA can thus only provide consistent estimates, if the researcher has sufficient knowledge about covariates that predict whether an individual would have received the treatment or not (Antonakis et al. 2010). However, not all covariates, related to treatment and outcome needs to be included, as a sufficient number of covariates is sufficient to delink selection into treatment from the outcome (Herzog 2014). Covariates omitted are controlled for the extent that they correlate with the covariates included in the propensity score and therefore from a theoretic perspective, the inclusion of only those covariates that effect the treatment assignment is sufficient and thus covariates related to the outcome can be neglected (Austin 2011). Yet, the decision to include certain variables as covariates or not should be generous, because there is no huge impact when including variables that actually do not influence the treatment variable. However, neglecting potentially important covariates could be very costly in regard to increased bias (Stuart 2010). In regard to this study, prior research has demonstrated the EI is influenced by gender (Carvalho et al. 2016; Cabello et al. 2016), cultural background (Van Rooy et al. 2005; Ng et al. 2007; Margavio et al. 2012) and age (Cabello et al. 2016). Consequently, these three characteristics will be considered as confounding covariates.

Furthermore, PSM aims to balance covariates between the treatment and control group, when the treatment is binary (Imai and David 2004). Though, the treatment variable for this study is EI, which is a continuous variable. EI has thus been dichotomized, in a way that participants, with a score in the upper third of the population in the examined EI dimension have been assigned to the treatment group and respectively, participants with a score in the lower third have been assigned to the control group.

4.3 Data Collection, Ethical Considerations, Sample and Measures

Data collection started July 13th 2018 and was conducted for eleven weeks. Any IS-professional, who had experienced ADM were welcome to participate in this research. Participation was anonymous, voluntary and without any compensation. The participants were also informed about the purpose of this research, that they are free to withdraw at any time and that everything they report is confidential.

Approximately 4.000 personal invitations were sent through online business network platforms. In total 324 participants completed the survey, within which 210 participants mainly worked in ADM projects, rather than in plan-driven or hybrid managed projects. In order to reduce bias, nine outliners were excluded from the dataset. Outliners, are participants with a score very different from the rest of the data (Field 2013). Furthermore, seven participants had received EI training before. As recent research indicated that these kind of trainings indeed can increase EI for adults (Schutte et al. 2013; Lopes 2016; Mattingly and Kraiger 2019), these participants were also excluded. As a result, the final sample contained 194 participants. Most participants were male (86%) and between 25 and 40 years old (77%). The cultural distribution is illustrated in Fig. 3.

The participants came from 53 different cultural backgrounds. Though, the majority either came from German (22%) or Indian (23%) cultural background. Despite of the high amount of German participants, the sample is a fair representation of the global software industry, which is dominated by men (Weilemann and Brune 2015) and also is the Indian IT service industry possessing a high share of the world market (Woszczynski et al. 2016).

4.4 Human Related Agile Challenges Inventory (HRACI)

So far, no instrument has been designed to measure the degree of perceived challenges in ADM projects and therefore the Human Related Agile Challenges Inventory (HRACI) had to be developed. The HRACI builds on previous research and contains the four dimensions: anxiety (ANX), motivation (MOT), communication (COM) and mutual trust (TRU).

Three indicators for each dimension have been derived based on identified human related challenges reported in the literature for ANX, MOT and TRU. The indicators for COM are based on the Self-Perceived Communication Competence Scale (McCroskey 1988). All indicators are assessed by means of a 5-point Likert-scale.

4.5 Wong and Law Emotional Intelligence Scale (WLEIS)

The WLEIS contains the four dimensions: appraisal and expression of emotion in oneself (SEA), appraisal and recognition of emotion in others (OEA), use of emotion to facilitate performance (UOE) and regulation of emotion in oneself (ROE) (Law et al. 2004). These four dimensions are based on the Salovey and Mayer Ability Model of Emotional Intelligence (Wong and Law 2002). Recent research confirmed similarities between the four dimensions used in the WLEIS and the four factors of Salovey and Mayer's Ability Model of Emotional Intelligence (Carvalho et al. 2016).

5 Data analysis

5.1 Hypothesis Testing

All analyses were conducted using IBM SPSS 24 and IBM AMOS 25. There was no missing data. Table 1 reports reliability statistics for all dimensions of HRACI and WLEIS. Cronbach-alphas were all above 0.7, indicating that the survey items were good indicators of the constructs they were supposed to measure.

Confirmatory factor analysis using maximum likelihood method was conducted to examine structure validity for both scales. According to Sun (2005), a $\chi 2$ / df ratio less than 2 or 3 and a RMSEA less than 0.08 indicate an acceptable model. For CFI and TLI a value greater than 0.9 indicates an acceptable fit and a value greater than 0.95 indicates a good fit. The results, which are presented in Table 2, demonstrate good fit for both scales.

The CFA model for HRACI and its standardized parameter estimates are shown in Fig. 4.

The standardized factor loadings for the HRACI are presented in Table 3. For the second-order factor model all factor loadings met the recommended cut-off criteria of 0.32 (Tabachnick and Fidell 2007) and most loaded well with >0.5. However, for the first-order factor model, except of COM, the factor loadings were low, with MOT and TRU even below the cut-off criteria.

Figure 5 presents the CFA model for the WLEIS and its standardized parameter estimates. The standardized factor loadings for the WLEIS are presented in Table 4. For the second-order factor model, except of s4, all factor loadings met the recommended cut-off criteria of 0.32 (Tabachnick
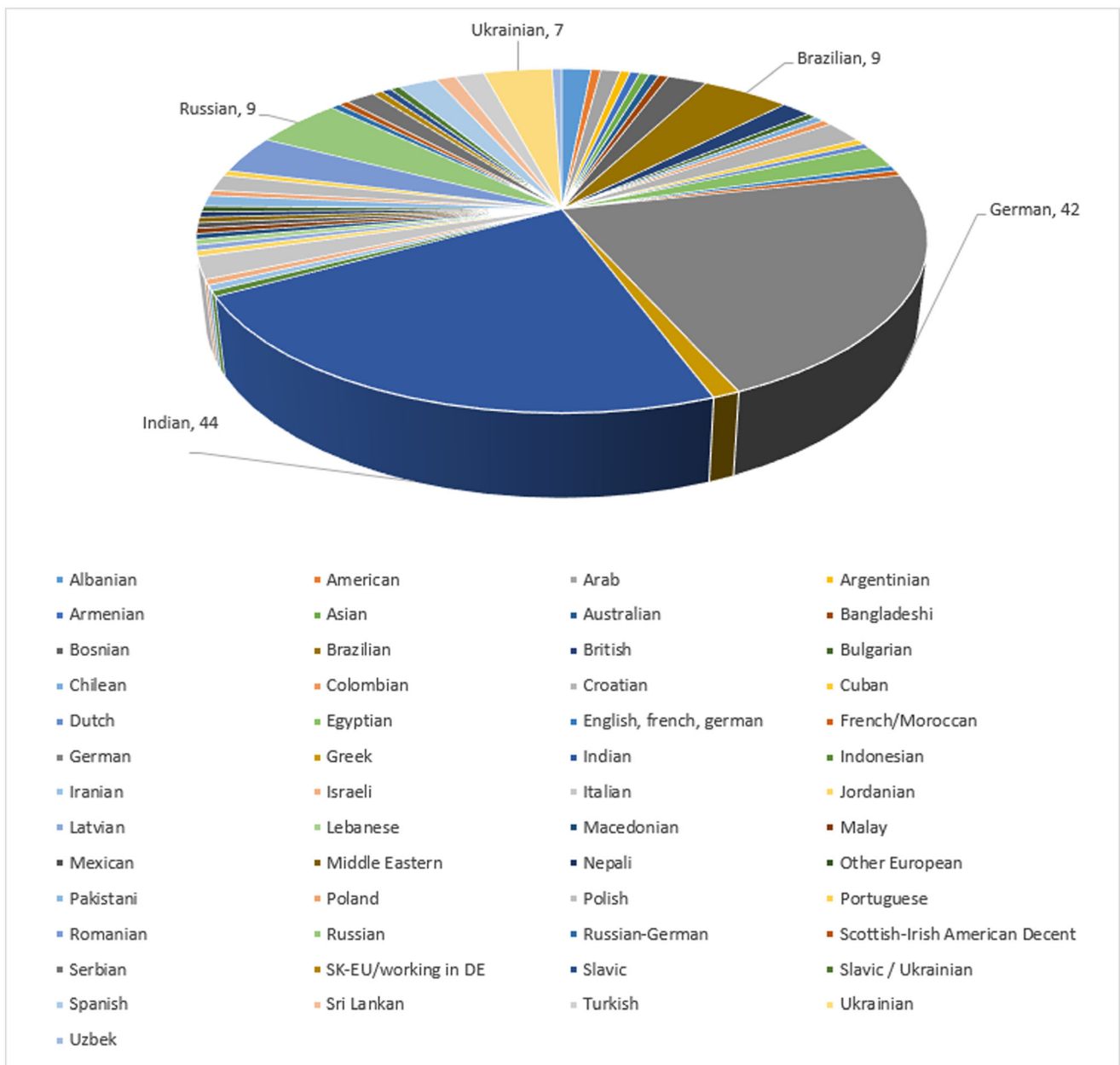
Fig. 3 Cultural distribution of 194 agile practitioners

and Fidell 2007) and most loaded well with >0.4. However, for the first-order factor model, except of SEA, the factor loadings were low, with OEA even below the cut-off criteria.

Correlations, as illustrated above are a prerequisite to indicate causal inference. As MOT, COM and TRU did not meet the assumption of normality, Spearman-rho was applied to calculate correlations which are presented in Table 5.

Hypothesis 1, proposing a negative association between ROE and ANX was not supported ($p = 0.106$). Hypothesis 2a and 2b, suggesting a negative association between MOT and UOE, as well as ROE were both fully supported with statistical significance ($p \leq 0.01$). Hypothesis 3a and 3c, suggesting a negative association between COM and SEA as well

as ROE were also both fully supported with statistical significance ($p \leq 0.001$). Hypothesis 3b proposing a negative association between COM and OEA was also supported with statistical significance ($p \leq 0.05$). Hypothesis 4a and 4c, suggesting a negative association between TRU and ROE, as well as OEA were both fully supported with statistical significance ($p \leq 0.01$). Finally hypothesis 4b, proposing a negative association between TRU and SEA was not supported ($p = 0.150$). The results also revealed three new findings that were not hypothesized. SEA and UOE were both significant negatively associated with ANX ($p \leq 0.05$). Finally, COM and UOE were also statistically significant negatively associated ($p \leq 0.001$). The revised conceptual model is presented in Fig. 6.

Table 1 Reliability statistics

Scale	Dimension	Mean	S.D.	Cronbach-alpha
HRACI	Anxiety	2.881	1.236	0.776
HRACI	Motivation	2.708	1.07	0.836
HRACI	Communication	2.18	1.042	0.875
HRACI	Mutual Trust	2.581	1.059	0.720
WLEIS	Appraisal and expression of emotion in oneself	3.919	0.864	0.818
WLEIS	Appraisal and recognition of emotion hi other	3.773	0.894	0.848
WLEIS	Use of emotion to facilitate performance	3.995	0.871	0.749
WLEIS	Regulation of emotion in oneself	3.657	0.973	0.857

$n = 194$

S.D. standard deviation

The analysis of the data has confirmed seven and rejected two of the proposed hypothesis. Also three new findings were identified. The confirmed hypothesis and the new findings will be discussed in section 6.

5.2 Impact of EI on Perceived Challenges

In order to quantify the impact of EI on the perceived challenges the Average Treatment Effects (ATE) were calculated for the ten combinations which were significant correlated. The ATEs were calculated by applying subclassification, with five subclasses defined by quantiles of the propensity score. This has the advantage that the initial bias due to covariates can be reduced to at least 90% (Stuart 2010). The ATEs are illustrated in Table 6.

The abilities to use emotion to facilitate performance and to regulate emotions in oneself had the highest impact on the measured challenges.

6 Discussion and Findings

The purpose of this research was to examine if a lack of EI has a negative impact on perceived human related challenges in agile teams within the dimensions of anxiety, motivation, communication competence and mutual trust. Data analyses revealed ten significant negative associations. Each dimension is now discussed.

Table 2 Goodness-of-fit-statistics

Scale	Models	$\chi^2_{(df)}$	χ^2/df	RMSEA	CFI	TLI
HRACI	Fist-order	$59.982_{(48)}$	1.250	0.036	0.986	0.981
HRACI	Second-order	$63.944_{(50)}$	1.279	0.038	0.984	0.979
WLEIS	First-order	$166.021_{(98)}$	1.694	0.060	0.949	0.938
I'LEIS	Second-order	$169.397_{(100)}$	1.694	0.060	0.948	0.938

### 6.1 EI as Protective Factor for Anxiety

The results showed that anxiety in agile teams is negatively related to the abilities of self-emotional appraisal and use of emotions. These findings are consistent with results of prior research. For example, male medical Iranian students perceive less test anxiety, if they have high EI (Ahmadpanah et al. 2016) or young Spanish football players who have low scores in perceiving and regulating their emotions report higher levels of anxiety (Castro-Sánchez et al. 2019). Recent research has indicated that EI can diminish the probability of anxiety (Abdollahi and Abu Talib 2015) and therefore can serve as a protective factor in the path from rumination to anxiety (Liu and Ren 2018).

These findings therefore support prior recommendations. If agile team members feel insecure, they might be reluctant to be transparent about their weaknesses and feel afraid to admit the truth about what is really happening in their teams (Dorairaj et al. 2012). Hence, such as that agile team members need an environment where they feel safe to expose their weaknesses (Conboy et al. 2011) and they need a sense of psychological safety, that is they must feel safe to speak up when noting a gap in others' work or difficulties in their own (Thorgren and Caiman 2019). Hence, the decision on the extent of agile use should consider concerns raised by agile team members and where significant anxiety is noted, management may wish to make participation optional if possible (Cram 2019).

6.2 EI as Predictor of Motivation

The results of this study have found that the abilities to use emotions and to regulate emotions are both negatively related to agile team members perceiving challenges in regard to motivation. This is in line with prior research, such as Law et al. (2008), who stated that EI is a reasonable predictor of motivation, because individuals with high EI are able to regulate and user their emotions to improve performance and therefore

Fig. 4 HRACI Standardized parameter estimates
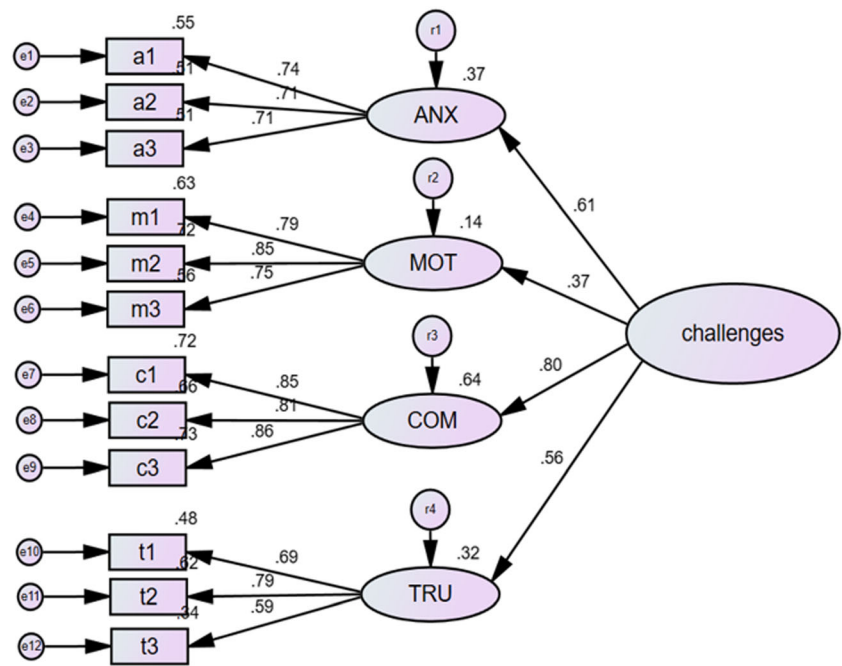
they are able to focus their efforts and maintain their motivation levels. In a similar vein, Christie et al. (2007) found that individuals with higher ability to regulate emotions are more likely to report being motivated by achievement needs. Recently, there has also been growing interest in examining the relation of EI and motivation in the context of athletes. For example, Rubaltelli et al. (2018) conducted a study to investigate the impact of EI on half marathon finish times. Their results suggested that individuals who are effective at controlling emotions can reduce the impact of fatigue, which then leads to better performance. They argued that this is in particular important when participating in foot races, as it takes great mental strength to keep going despite feeling close to exhaustion. In another recent study related to athletes, Sukys et al. (2019) examined adult basketball players and reported that the ability to manage emotions is negatively related to athletes' motivation to perform.

In regard to agile teams, Javdani Gandomani and Ziaei Nafchi (2016) thus suggested that agile team members, who experience motivation challenges, need more time to change themselves and to find their ways to adopt agile practices.

## 6.3 All EI Dimensions are Related to Communication Competence

The results have revealed that all four dimensions of EI, self-emotional appraisal, others' emotional appraisal, use of emotions and regulation of emotions are significantly related to communication challenges occurring in agile teams. The results of this research are in line with what has been previously reported. For example, a significant relationship between EI and social communication competence has been found when examining American IS-professionals (Hendon et al. 2017), Malaysian students with high EI have been reported to better command in communication skills (Ahmad Marzuki et al. 2015) or the ability to manage others' emotions is significantly correlated with communication performance (Troth et al. 2012b).

The security and ease of communication is fundamental in ADM projects, in order to keep individual team members in sync with the iterative cycle as well as with other team members (Thorgren and Caiman 2019). Hence, organizations should not simply hire IS-professionals based upon their

Table 3 HRACI Standardized factor loadings

Dimensions	al	a2	a3	ml	m2	m3	cl	c2	c3	tl	t2	t3	ANX	MOT	COM	TRU
ANX	0.554	0.506	0.509													
MOT				0.629	0.716	0.559										
COM							0.717	0.659	0.717							
TRU										0.481	0.624	0.342				
challenges													0.367	0.135	0.639	0.319

Fig. 5 WLEIS Standardized parameter estimates
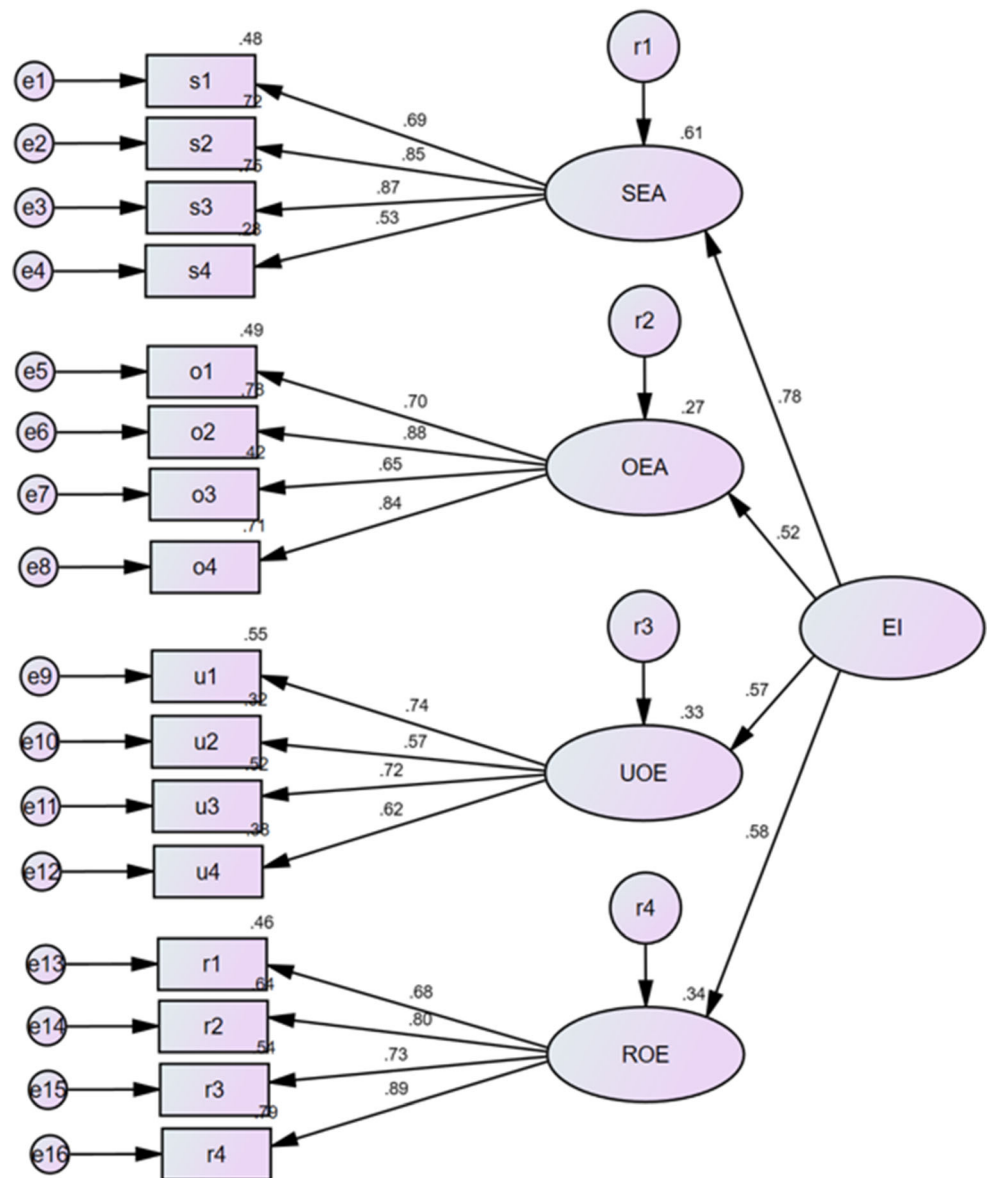
technical strength, but pay attention to their EI and communication skills (Hendon et al. 2017).

6.4 EI Fosters Mutual Trust

The results provide preliminary evidence that mutual trust challenges in agile teams are negative related to the ability to appraise others' emotions and the ability to regulate one's own emotions. The results confirm prior finding, such as that EI promotes team trust and trust in turn fosters a collaborative culture which then enhances the creativity of the team (Barczak et al. 2010), that the EI is positively related to trust (Rezvani et al. 2016) or that EI mitigates stress and therefore fosters trust among software developers (Rezvani and Khosravi 2019). Hence, EI plays a key role in social situations, instilling feelings of trust and cooperation, in particular

in highly stressful work conditions, such as complex projects (Rezvani et al. 2016).

7 Contribution

7.1 Contribution to Theory

This study has made four notable contributions to theory. First, this study has provided preliminary evidence that EI plays an important role in agile teams and thus extends the research on critical success factors in ADM-projects. So far, the current literature has only highlighted the importance of quality, scope, time and costs (Chow and Cao 2008) or organizational, team and customer factors (Ahimbisibwe et al. 2015). Second, this research also contributes to research

Table 4 WLEIS Standardized factor loadings

Dimensions	s1	s2	s3	s4	o1	o2	o3	o4	u1	u2	u3	u4	r1	r2	r3	r4	SEA	OEA	UOE	ROE
SEA	0.480	0.724	0.752	0.283																
OEA					0.488	0.783	0.420	0.710												
UOE									0.549	0.322	0.525	0.385								
ROE													0.457	0.639	0.540	0.793				
EI																	0.605	0.275	0.327	0.338

efforts on the vital role of EI in the workplace. Consistent with past studies, it confirms that EI measured as self-report ability by WLEIS is a significant predictor for job performance beyond the effect of general mental ability (Wong and Law 2002; Trivellas et al. 2013; Chen et al. 2015; Law et al. 2008). Third, the benefits of applying PSM in psychological and organizational research have been demonstrated. Although, PSM has gained popularity in fields such as economics, epidemiology, medicine and political science (Stuart 2010), due to a lack of understanding of the underlying principles of PSM techniques, is has yet not been widely applied in psychological research (Harder et al. 2010). Fourth, an increasing body of literature has reported human related challenges perceived by agile team members (Conboy et al. 2011; Lalsing et al. 2012; Javdani Gandomani and Ziaei Nafchi 2016). Yet, there has been a lack of a practical measure for these challenges. This paper has developed the HRACI, which has demonstrated good internal validity for all its dimensions.

7.2 Contribution to Practice

Two key managerial implications follow from these discussions. First, the findings clearly advocate the need to consider and assess the EI of IS-professionals when staffing ADM-projects. This study therefore provides support for researchers who have argued that prior research has focusing on technical skills of software developers on project outcome, yet underestimated social and emotional skills (Rezvani and Khosravi 2019) or who advocated that employers should select employees not only based on their technical skills, but also if they can express their expertise with the use of positive EI and communication effectiveness (Hendon et al. 2017). Second, training of agile team members should go beyond improving only their technical skills but also include special EI awareness and development training. Preliminary evidence exists, that EI indeed can be trained (e.g. Nelis et al. (2011), Lopes (2016) or Mattingly and Kraiger (2019)). Compared to more long-term or costly talent management approaches, EI training programs can provide a more immediate benefit to organizations, such as improved performance and affective outcomes (Mattingly and Kraiger 2019).

8 Limitations and Future Research

This research has some limitations that needs to be taken into account. First, both HRACI, as well as WLEIS are self-report measures and therefore are prone to self-enhancement and socially desirable responses (Lopes 2016). Hence, scholars have raised concerns, if EI assessed by self- report measures, actually measures an actual ability rather than a trait (Mayer et al. 2008; Brannick et al. 2009; Joseph and Newman 2010). Contrariwise, self-report EI measures are more efficient to

Table 5 Correlation matrix

Dimension	Anxiety	Motivation	Communication	Mutual Trust
Appraisal and expression of emotion in oneself	−0.155[*]	−0.074	−0.268[***]	−0.104
Appraisal and recognition of emotion in others	−0.023	−0.034	−0.154[*]	−0.195[**]
Use of emotion to facilitate performance	−0.177[*]	−0.195[**]	−0.248[***]	−0.095
Regulation of emotion in oneself	−0.116	−0.202[**]	−0.274[***]	−0.226[**]

[***] $p \leq 0.001$; [**] $p \leq 0.01$; [*] $p \leq 0.05$; $n = 194$ (two-tailed test)

assess EI in cross-cultural settings, because they tap into typical attributes of the individual's thoughts, feelings, and behaviors in certain situations (Li et al. 2012). Subjective assessments may even provide a more comprehensive view of (perceived) emotional abilities, because test-takers are more likely to draw upon their full range of emotional experience across different context in life (Lopes 2016).

Second, the continuous treatment variable EI has been dichotomized. Although, methods such as the Generalized Propensity Score (Hirano and Guido 2004) exists, diagnostics are complicated for these methods, as it becomes more complex to assess the balance of the covariates (Stuart 2010). Consequently, the application of PSM to continuous treatment is rare (Fong et al. 2018) and researchers often dichotomize the continuous treatment variable in order to apply PSM (e.g. (Nielsen et al. 2011; De and Ratha 2012)).

Third, the authors acknowledge that the sample only includes IS-professionals and thus limits the generalizability of the research findings. Yet, this creates research opportunities for future researchers to examine if the preliminary findings of this study can be extended into other domains. This is in particular important, as although originally designed for software
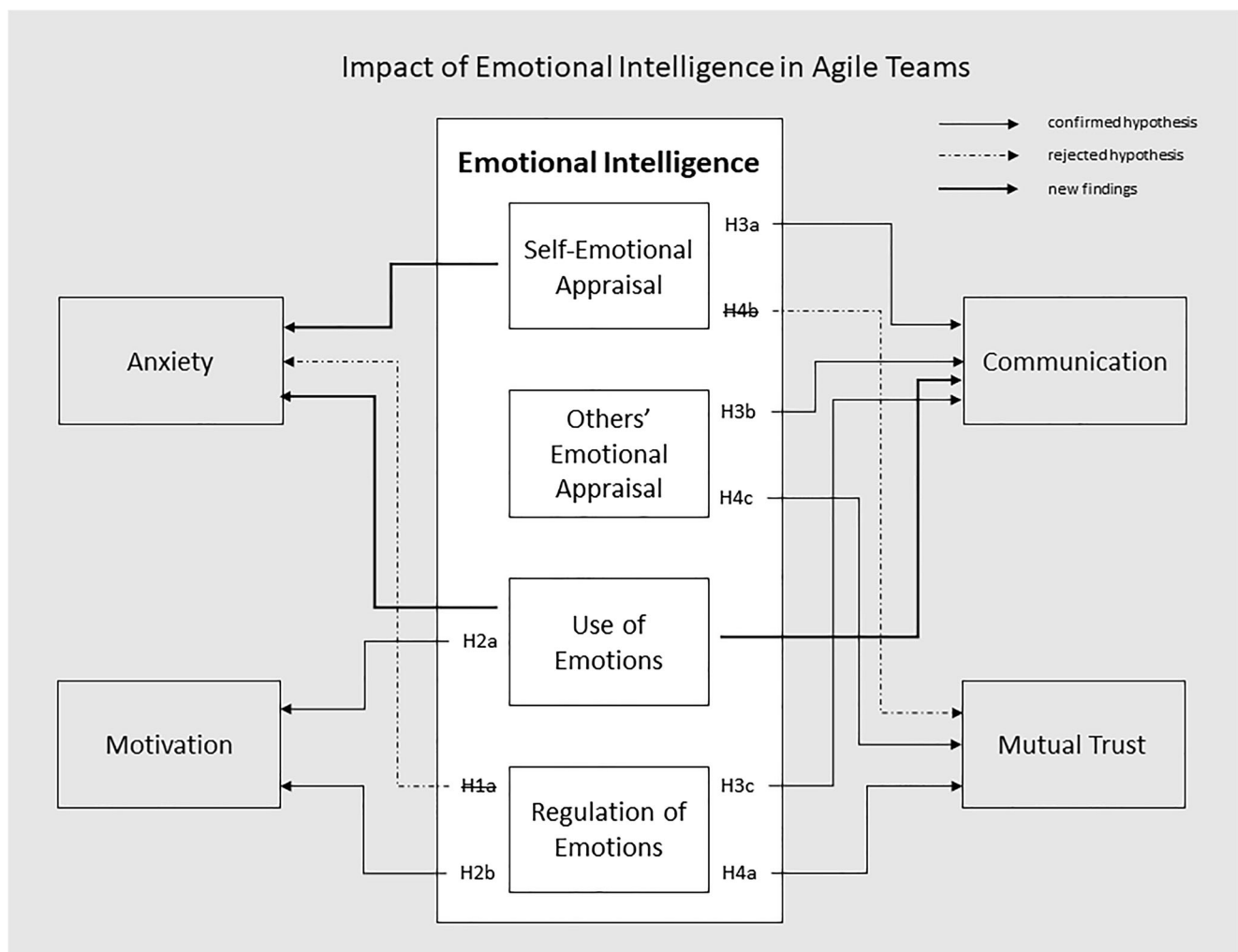
Fig. 6 Revised conceptual model "Impact of Emotional Intelligence in Agile teams" (source: author)

Table 6 Average treatment effect

Dimension	Anxiety	Motivation	Communication	Mutual Trust
Appraisal and expression of emotion in oneself	−0.29		−0.43	
Appraisal and recognition of emotion in others			−0.17	−0.31
Use of emotion to facilitate performance	−0.62	−0.45	−0.34	
Regulation of emotion in oneself		−0.29	−0.32	−0.25

development, due to its success ADM have now also spread to non-IS projects (Serrador and Pinto 2015; Hoda et al. 2018), such as product development (Ramesh et al. 2019) and also moved into mainstream thinking as management practice (Birkinshaw 2019). Furthermore, human-related challenges related to anxiety, motivation, mutual trust or communication competence are not limited to collaboration in agile teams, yet occur in everybody's daily life whenever people socially interact.

9 Conclusions

With the increasing popularity of ADM in modern software development, agile practitioners realized that its adoption within an organization is challenging . Yet, prior work has only focused on reporting various human related challenges, without providing insights about their origins. The findings of this study provide preliminary evidence that these challenges are negatively related to specific dimensions of EI.

Finally, the importance of EI in ADM might even become more important with the emergence of Aritifical Intelligence (AI). Recent research suggests that AI might assist human programmers in coding, e.g. AI could act as pair programming partner or humans could focus on writing test cases and AI would create the corresponding code. However, AI is less suitable for unstructured tasks, such as interacting with others or the potentially emotionally fraught tasks of communicating. Thus, with the increasing use of AI, the human role in ADM might shift from coding into primarily focusing on unstructured tasks, such as organizing and collaboration, which then might result in more human related challenges.

References

Abbott, M. L., & McKinney, J. (2013). *Understanding and applying research design* (1st;1. Aufl.;1; ed., Vol. book, whole). Somerset: John Wiley & Sons, Incorporated.

Abdollahi, A., & Abu Talib, M. (2015). Emotional intelligence moderates perfectionism and test anxiety among Iranian students. *School Psychology International, 36*(5), 498–512. https://doi.org/10.1177/0143034315603445.

Ahimbisibwe, A., Cavana, R. Y., & Daellenbach, U. (2015). A contingency fit model of critical success factors for software development projects. *Journal of Enterprise Information Management, 28*(1), 7.

Ahmad Marzuki, N., Mustaffa, C. S., & Mat Saad, Z. (2015). Emotional intelligence: Its relations to communication and information technology skills. *Asian Social Science, 11*(15). https://doi.org/10.5539/ass.v11n15p267.

Ahmadpanah M., Keshavarz M, Haghighi M, Jahangard L, Bajoghli H, Sadeghi Bahmani D, et al. (2016). Higher emotional intelligence is related to lower test anxiety among students. *Neuropsychiatric Disease and Treatment, 2016*(Issue 1), 133-136.

Antonakis, J., Bendahan, S., Jacquart, P., & Lalive, R. (2010). On making causal claims: A review and recommendations. *The Leadership Quarterly, 21*(6), 1086–1120. https://doi.org/10.1016/j.leaqua.2010.10.010.

Arthur, W., & Villado, A. J. (2008). The importance of distinguishing between constructs and methods when comparing predictors in personnel selection research and practice. *Journal of Applied Psychology, 93*(2), 435–442. https://doi.org/10.1037/0021-9010.93.2.435.

Austin, P. C. (2011). An introduction to propensity score methods for reducing the effects of confounding in observational studies. *Multivariate Behavioral Research, 46*(3), 399–424. https://doi.org/10.1080/00273171.2011.568786.

Barczak, G., Lassk, F., & Mulki, J. (2010). Antecedents of team creativity: An examination of team emotional intelligence, team trust and collaborative culture. *Creativity and Innovation Management, 19*(4), 332. https://doi.org/10.1111/j.1467-8691.2010.00574.x.

Bar-On, R. (1997). *BarOn emotioal quotient inventory: Technical manual*. Toronto.

Beecham, S., Baddoo, N., Hall, T., Robinson, H., & Sharp, H. (2008). Motivation in software engineering: A systematic literature review. *Information and Software Technology, 50*(9), 860–878. https://doi.org/10.1016/j.infsof.2007.09.004.

Begel, A., & Nagappan, N. (2007). Usage and perceptions of agile software development in an industrial context: An exploratory study. In, 2007 (pp. 255–264): IEEE. https://doi.org/10.1109/ESEM.2007.12.

Birkinshaw, J. (2019). What to expect from agile. *MIT Sloan Management Review, 60*(3), 1–37.

Boehm, B., & Turner, R. (2005). Management challenges to implementing agile processes in traditional development organizations. *IEEE Software, 22*(5), 30–39. https://doi.org/10.1109/MS.2005.129.

Box-Steffensmeier, J. (2007). *The Neyman-Rubin model of causal inference and estimation via matching methods.*

Brannick, M. T., Wahi, M. M., Arce, M., Johnson, H.-A., Nazian, S., & Goldin, S. B. (2009). Comparison of trait and ability measures of emotional intelligence in medical students. *Medical Education, 43*(11), 1062–1068. https://doi.org/10.1111/j.1365-2923.2009.03430.x.

Brynjolfsson, E., & Mitchell, T. (2017). What can machine learning do? Workforce implications. *Science (New York, N.Y.), 358*(6370), 1530–1534. https://doi.org/10.1126/science.aap8062.

Cabello, R., Sorrel, M. A., Fernández-Pinto, I., Extremera, N., & Fernández-Berrocal, P. (2016). Age and gender differences in ability emotional intelligence in adults: A cross-sectional study. *Developmental Psychology, 52*(9), 1486–1492. https://doi.org/10.1037/dev0000191.

Capretz, L. F. (2003). Personality types in software engineering. *International Journal of Human - Computer Studies, 58*(2), 207–214. https://doi.org/10.1016/S1071-5819(02)00137-4.

Carvalho, V. S., Guerrero, E., Chambel, M. J., & González-Rico, P. (2016). Psychometric properties of WLEIS as a measure of emotional intelligence in the Portuguese and Spanish medical students. *Evaluation and Program Planning, 58*, 152–159. https://doi.org/10.1016/j.evalprogplan.2016.06.006.

Castro-Sánchez, M., Zurita-Ortega, F., Ubago-Jiménez, J. L., González-Valero, G., & Chacón-Cuberos, R. (2019). Relationships between anxiety, emotional intelligence, and motivational climate among adolescent football players. *Sports (Basel, Switzerland), 7*(2), 34. https://doi.org/10.3390/sports7020034.

Chen, A. S.-y., Bian, M.-d., & Hou, Y.-H. (2015). Impact of transformational leadership on subordinate's EI and work performance. *Personnel Review, 44*(4), 438.

Cho, S., Drasgow, F., & Cao, M. (2015). An investigation of emotional intelligence measures using item response theory. *Psychological Assessment, 27*(4), 1241.

Chow, T., & Cao, D.-B. (2008). A survey study of critical success factors in agile software projects. *Journal of Systems and Software, 81*(6), 961–971. https://doi.org/10.1016/j.jss.2007.08.020.

Christie, A., Jordan, P., Troth, A. C., & Lawrence, S. (2007). Testing the links between emotional intelligence and motivation. *Journal of Management and Organization, 13*(3), 212–226. https://doi.org/10.1017/S1833367200003709.

Ciarrochi, J., & Mayer, J. D. (2013). *Applying emotional intelligence : A practitioner's guide*. London: Taylor and Francis.

Ciarrochi, J. V., Chan, A. Y. C., & Caputi, P. (2000). A critical evaluation of the emotional intelligence construct. *Personality and Individual Differences, 28*(3), 539–561. https://doi.org/10.1016/S0191-8869(99)00119-1.

Cobb, C. G. (2011). *Making sense of agile project management : Balancing control and agility*. Hoboken: Wiley.

Cockburn, A., & Highsmith, J. (2001). Agile software development, the people factor. *Computer, 34*(11), 131–133. https://doi.org/10.1109/2.963450.

Conboy, K., Coyle, S., Wang, X., & Pikkarainen, M. (2011). People over process: Key challenges in agile development. *IEEE Software, 28*(4), 48–57. https://doi.org/10.1109/MS.2010.132.

Cooper, R. G. (2014). What's next? After stage-gate: Progressive companies are developing a new generation of idea-to-launch processes. *Research-Technology Management, 57*(1), 20. https://doi.org/10.5437/08956308X5606963.

Cooper, R. G., & Sommer, A. F. (2016). The agile–stage-gate hybrid model: A promising new approach and a new research opportunity. *Journal of Product Innovation Management, 33*(5), 513–526. https://doi.org/10.1111/jpim.12314.

Côté, S. (2017). Enhancing managerial effectiveness via four core facets of emotional intelligence. *Organizational Dynamics, 46*(3), 140–147. https://doi.org/10.1016/j.orgdyn.2017.05.007.

Cram, W. A. (2019). Agile development in practice: Lessons from the trenches. *Information Systems Management, 36*(1), 2–14. https://doi.org/10.1080/10580530.2018.1553645.

De, P. K., & Ratha, D. (2012). Impact of remittances on household income, asset and human capital: Evidence from Sri Lanka. *Migration and Development, 1*(1), 163–179. https://doi.org/10.1080/21632324.2012.719348.

Dorairaj, S., Noble, J., & Malik, P. (2012). Understanding lack of trust in distributed agile teams: A grounded theory study. In *Stevenage, 2012 2012* (1 ed., Vol. 2012, pp. 81-90): The institution of Engineering & Technology. https://doi.org/10.1049/ic.2012.0011.

Dybå, T., & Dingsøyr, T. (2008). Empirical studies of agile software development. A systematic review. *Information and Software Technology, 50*(9–10), 833–859. https://doi.org/10.1016/j.infsof.2008.01.006.

Field, A. (2013). *Discovering statistics using IBM SPSS Statistics* (4th edition ed.): Sage.

Fong, C. H., Chad, & Kosuke, I. (2018). Covariate BALANCING propensity score for a continuous treatment: Application to the efficacy of political advertisements. *The Annals of Applied Statistics, 12*(1), 156–177.

Forrest, C. L. (2012). An illustrative example of propensity score matching with education research. *Career and Technical Education Research*.

Fortmann, L. (2018). Agile or fragile? - the depleting effects of agile methodologies for software developers. In *ECIS*.

George, J. M. (2000). Emotions and leadership: The role of emotional intelligence. *Human Relations, 53*(8), 1027–1055. https://doi.org/10.1177/0018726700538001.

Ghobadi, S., & Mathiassen, L. (2016). Perceived barriers to effective knowledge sharing in agile software teams. *Information Systems Journal, 26*(2), 95–125. https://doi.org/10.1111/isj.12053.

Goh, J. C.-L., Pan, S. L., & Zuo, M. (2013). Developing the agile IS development practices in large-scale IT projects: The trust-mediated organizational controls and IT project team capabilities perspectives. *Journal of the Association for Information Systems, 14*(12), 722.

Goodpasture, J. C. (2010). *Project management the agile way: making it work in the enterprise* (Vol. book, whole). Ft. Lauderdale, Fla: J. Ross Pub.

Gregory, P., Barroca, L., Sharp, H., Deshpande, A., & Taylor, K. (2016). The challenges that challenge: Engaging with agile practitioners' concerns. *Information and Software Technology, 77*, 92–104. https://doi.org/10.1016/j.infsof.2016.04.006.

Harder, V. S., Stuart, E. A., & Anthony, J. C. (2010). Propensity score techniques and the assessment of measured covariate balance to test causal associations in psychological research. *Psychological Methods, 15*(3), 234–249. https://doi.org/10.1037/a0019623.

Helal, S. (2018). The expanding frontier of artificial intelligence. *Computer, 51*(9), 14–17. https://doi.org/10.1109/MC.2018.3620976.

Hendon, M., Powell, L., & Wimmer, H. (2017). Emotional intelligence and communication levels in information technology professionals. *Computers in Human Behavior, 71*, 165–171. https://doi.org/10.1016/j.chb.2017.01.048.

Henttonen, K., & Blomqvist, K. (2005). Managing distance in a global virtual team: The evolution of trust through technology-mediated relational communication. *Strategic Change, 14*(2), 107–119. https://doi.org/10.1002/jsc.714.

Herzog, S. (2014). The propensity score analytical framework: An overview and institutional research example. *New Directions for Institutional Research, 2014*(161), 21–40. https://doi.org/10.1002/ir.20065.

Hirano, K., Imbens, G. (2004). The propensity score with continuous treatments.

Hoda, R., & Murugesan, L. K. (2016). Multi-level agile project management challenges: A self-organizing team perspective. *Journal of Systems and Software, 117*, 245–257. https://doi.org/10.1016/j.jss.2016.02.049.

Hoda, R., Salleh, N., & Grundy, J. (2018). The rise and evolution of agile software development. *IEEE Software, 35*(5), 58–63. https://doi.org/10.1109/MS.2018.290111318.

Hummel, M., Rosenkranz, C., & Holten, R. (2013). The role of communication in agile systems development: An analysis of the state of the art. *Business & Information Systems Engineering, 5*(5), 343–355. https://doi.org/10.1007/s12599-013-0282-4.

Iliceto, P., & Fino, E. (2017). The Italian version of the Wong-Law emotional intelligence scale (WLEIS-I): A second-order factor analysis. *Personality and Individual Differences, 116*, 274–280. https://doi.org/10.1016/j.paid.2017.05.006.

Imai, K., & David, A. V. D. (2004). Causal inference with general treatment regimes: Generalizing the propensity score. *Journal of the American Statistical Association, 99*(467), 854–866. https://doi.org/10.1198/016214504000001187.

Javdani Gandomani, T., & Ziaei Nafchi, M. (2016). Agile transition and adoption human-related challenges and issues: A grounded theory approach. *Computers in Human Behavior, 62*, 257–266. https://doi.org/10.1016/j.chb.2016.04.009.

Joseph, D. L., & Newman, D. A. (2010). Emotional intelligence: An integrative meta-analysis and cascading model. *Journal of Applied Psychology, 95*(1), 54–78. https://doi.org/10.1037/a0017286.

Kakar, A. K. (2017). Assessing self-organization in agile software development teams. *The Journal of Computer Information Systems, 57*(3), 208–210. https://doi.org/10.1080/07362994.2016.1184002.

Kalenda, M., Hyna, P., & Rossi, B. (2018). Scaling agile in large organizations: Practices, challenges, and success factors. *Journal of Software: Evolution and Process, 30*(10), e1954–n/a. https://doi.org/10.1002/smr.1954.

Kosti M V, Feldt R, Angelis L, Blekinge Tekniska H. (2014). Personality, emotional intelligence and work preferences in software engineering: An empirical study. *Information and Software Technology, 56*(8), 973–990. https://doi.org/10.1016/j.infsof.2014.03.004.

Kovitz, B. (2003). Hidden skills that support phased and agile requirements engineering. *Requirements Engineering, 8*(2), 135–141. https://doi.org/10.1007/s00766-002-0162-9.

Krakovsky, M. (2018). Artificial (Emotional). *Intelligence., 61*(4), 18.

Lalsing, V., Kishnah, S., & Pudaruth, S. (2012). People factors in agile software development and project management. *International Journal of Software Engineering & Applications, 3*(1), 117–137.

Law, K. S., Wong, C.-S., & Song, L. J. (2004). The construct and criterion validity of emotional intelligence and its potential utility for management studies. *Journal of Applied Psychology, 89*(3), 483–496. https://doi.org/10.1037/0021-9010.89.3.483.

Law, K. S., Wong, C.-S., Huang, G.-H., & Li, X. (2008). The effects of emotional intelligence on job performance and life satisfaction for the research and development scientists in China. *Asia Pacific Journal of Management, 25*(1), 51–69. https://doi.org/10.1007/s10490-007-9062-3.

Lee, H., & Kwak, Y. (2012). Development and initial validation of a trait emotional intelligence scale for Korean adults. *Asia Pacific Education Review, 13*(2), 209–217. https://doi.org/10.1007/s12564-011-9175-8.

Lenberg, P., Feldt, R., Wallgren, L. G., Institutionen för, p., Fakulteten för, d, & Blekinge Tekniska, H. (2015). Behavioral software engineering: A definition and systematic literature review. *The Journal of Systems & Software, 107*, 15–37. https://doi.org/10.1016/j.jss.2015.04.084.

Li, T., Saklofske, D. H., Bowden, S. C., Yan, G., & Fung, T. S. (2012). The measurement invariance of the Wong and Law emotional intelligence scale (WLEIS) across three Chinese University student groups from Canada and China. *Journal of Psychoeducational Assessment, 30*(4), 439–452. https://doi.org/10.1177/0734282912449449.

Libbrecht, N., Beuckelaer, A. d., Lievens, F., & Rockstuhl, T. (2014). Measurement invariance of the Wong and Law emotional intelligence scale scores: Does the measurement structure hold across far eastern and European countries? *Applied Psychology, 63*(2), 223–237. https://doi.org/10.1111/j.1464-0597.2012.00513.x.

Lindvall, M., Basili, V., Boehm, B., Costa, P., Dangle, K., Shull, F., Tesoriero, R.,, & Williams, L., Zelkowitz (2002). Empirical findings in agile methods. *Proceedings of Extreme Programming and Agile Methods – XP/Agile Universe*.

Liu, M., & Ren, S. (2018). Moderating effect of emotional intelligence on the relationship between rumination and anxiety. *Current Psychology, 37*(1), 272–279. https://doi.org/10.1007/s12144-016-9510-7.

Lopes, P. N. (2016). Emotional intelligence in organizations: Bridging research and practice. *Emotion Review, 8*(4), 316–321. https://doi.org/10.1177/1754073916650496.

Macht, G. A., Nembhard, D. A., & Leicht, R. M. (2019). Operationalizing emotional intelligence for team performance. *International Journal of Industrial Ergonomics, 71*, 57–63. https://doi.org/10.1016/j.ergon.2019.02.007.

Mandal, A., & Pal, S. C. (2015). Achieving agility through BRIDGE process model: An approach to integrate the agile and disciplined software development. [journal article]. *Innovations in Systems and Software Engineering, 11*(1), 1–7. https://doi.org/10.1007/s11334-014-0239-x.

Margavio, T. M., Margavio, G. W., Hignite, M. A., & Moses, D. R. (2012). A comparative analysis of the emotional intelligence levels of American and Chinese business students. *College Student Journal, 46*(4), 776.

Martínez-Monteagudo, M. C., Inglés, C. J., Granados, L., Aparisi, D., & García-Fernández, J. M. (2019). Trait emotional intelligence profiles, burnout, anxiety, depression, and stress in secondary education teachers. *Personality and Individual Differences, 142*, 53–61. https://doi.org/10.1016/j.paid.2019.01.036.

Mattingly, V., & Kraiger, K. (2019). Can emotional intelligence be trained? A meta-analytical investigation. *Human Resource Management Review, 29*(2), 140–155. https://doi.org/10.1016/j.hrmr.2018.03.002.

Mayer, J. D., & Salovey, P. (1993). The intelligence of emotional intelligence. *Intelligence, 17*(4), 433–442. https://doi.org/10.1016/0160-2896(93)90010-3.

Mayer, J., & Salovey, P. (1997). What is emotional intelligence? *Emotional development and emotional intelligence: Educational implications*, 3–34.

Mayer, J., Caruso, D. R., & Salovey, P. (1999). Emotional intelligence meets traditional standards for an intelligence. *Intelligence, 27*(4), 267–298. https://doi.org/10.1016/S0160-2896(99)00016-1.

Mayer, J. D., Salovey, P., & Caruso, D. R. (2008). Emotional intelligence: New ability or eclectic traits? *American Psychologist, 63*(6), 503–517. https://doi.org/10.1037/0003-066X.63.6.503.

Mayer, J. D., Caruso, D. R., & Salovey, P. (2016). The ability model of emotional intelligence: Principles and updates. *Emotion Review, 8*(4), 290–300. https://doi.org/10.1177/1754073916639667.

McCroskey, M. C. (1988). Self-report as an approach to measuring communication competence. *Communication Research Reports, 5*, 108–113.

Melnik, G., & Maurer, F. (2004). Direct verbal communication as a catalyst of agile knowledge sharing. In*, 2004* (pp. 21–31): IEEE. https://doi.org/10.1109/ADEVC.2004.12.

Mithas, S., Kude, T., & Whitaker, J. (2018). Artificial intelligence and IT professionals. *IT Professional, 20*(5), 6–13. https://doi.org/10.1109/MITP.2018.053891331.

Moe, N. B., Aurum, A., & Dybå, T. (2012). Challenges of shared decision-making: A multiple case study of agile software development.

Information and Software Technology, 54(8), 853–865. https://doi.org/10.1016/j.infsof.2011.11.006.

Nelis, D., Kotsou, I., Quoidbach, J., Hansenne, M., Weytens, F., Dupuis, P., et al. (2011). Increasing emotional competence improves psychological and physical well-being, social relationships, and employability. *Emotion, 11*(2), 354–366. https://doi.org/10.1037/a0021554.

Ng, K.-M., Wang, C., Zalaquett, C. P., & Bodenhorn, N. (2007). A confirmatory factor analysis of the Wong and Law emotional intelligence scale in a sample of international college students. *International Journal for the Advancement of Counselling, 29*(3), 173–185. https://doi.org/10.1007/s10447-007-9037-6.

Nielsen, R. A., Findley, M. G., Davis, Z. S., Candland, T., & Nielson, D. L. (2011). Foreign aid shocks as a cause of violent armed conflict. *American Journal of Political Science, 55*(2), 219–232. https://doi.org/10.1111/j.1540-5907.2010.00492.x.

Pankratz, O., & Basten, D. (2017). Opening the black Box: Managers' Perceptions of IS Project Success Mechanisms. *Information & Management*, doi:https://doi.org/10.1016/j.im.2017.09.005.

Pedersen, M. (2013). *A quantitative examination of critical success factors comparing agile and waterfall project management methodologies.* ProQuest Dissertations Publishing,

Petrides, K. V., & Furnham, A. (2001). Trait emotional intelligence: Psychometric investigation with reference to established trait taxonomies. *European Journal of Personality, 15*(6), 425–448. https://doi.org/10.1002/per.416.

Petrovici, A., & Dobrescu, T. (2014). The role of emotional intelligence in building interpersonal communication skills. *Procedia - Social and Behavioral Sciences, 116*, 1405–1410. https://doi.org/10.1016/j.sbspro.2014.01.406.

Pikkarainen, M., Haikara, J., Salo, O., Abrahamsson, P., & Still, J. (2008). The impact of agile practices on communication in software development. *Empirical Software Engineering, 13*(3), 303–337. https://doi.org/10.1007/s10664-008-9065-9.

Pikkarainen, M., Salo, O., Kuusela, R., & Abrahamsson, P. (2012). Strengths and barriers behind the successful agile deployment—Insights from the three software intensive companies in Finland. *Empirical Software Engineering, 17*(6), 675–702. https://doi.org/10.1007/s10664-011-9185-5.

Radujković, M., Vukomanović, M., Wagner, R., & Špundak, M. (2014). Selected papers from the 27th IPMA (International Project Management Association), World Congress, Dubrovnik, Croatia, 2013mixed agile/traditional Project Management methodology – Reality or illusion? *Procedia - Social and Behavioral Sciences, 119*, 939–948. https://doi.org/10.1016/j.sbspro.2014.03.105.

Ramesh, B., Cao, L., Kim, J., Mohan, K., & James, T. L. (2019). Consider culture when implementing agile practices. *MIT Sloan Management Review, 60*(3), 1–37.

Rezvani, A., & Khosravi, P. (2019). Emotional intelligence: The key to mitigating stress and fostering trust among software developers working on information system projects. *International Journal of Information Management, 48*, 139–150. https://doi.org/10.1016/j.ijinfomgt.2019.02.007.

Rezvani, A., Chang, A., Wiewiora, A., Ashkanasy, N. M., Jordan, P. J., & Zolin, R. (2016). Manager emotional intelligence and project success: The mediating role of job satisfaction and trust. *International Journal of Project Management, 34*(7), 1112–1122. https://doi.org/10.1016/j.ijproman.2016.05.012.

Roberts, R. D., Zeidner, M., & Matthews, G. (2001). Does emotional intelligence meet traditional standards for an intelligence? Some new data and conclusions. *Emotion, 1*(3), 196–231. https://doi.org/10.1037/1528-3542.1.3.196.

Robson, S. (2013). *Agile SAP: introducing flexibility, transparency and speed to SAP implementations* (Vol. book, whole): IT Governance Pub.

Rosete, D., & Ciarrochi, J. (2005). Emotional intelligence and its relationship to workplace performance outcomes of leadership effectiveness. *Leadership & Organization Development Journal, 26*(5), 388–399. https://doi.org/10.1108/01437730510607871.

Rossi, F. (2018). Building trust in ARTIFICIAL intelligence. *Journal of International Affairs, 72*(1), 127.

Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management Review, 23*(3), 393–404. https://doi.org/10.5465/amr.1998.926617.

Rubaltelli, E., Agnoli, S., & Leo, I. (2018). Emotional intelligence impact on half marathon finish times. *Personality and Individual Differences, 128*, 107–112. https://doi.org/10.1016/j.paid.2018.02.034.

Rubin, D. B. (1974). Estimating causal effects of treatments in randomized and nonrandomized studies. *Journal of Educational Psychology, 66*, 668–701.

Russo, F., Wunsch, G., & Mouchart, M. (2011). Inferring causality through counterfactuals in observational studies - some epistemological issues. Bulletin de Méthodologie Sociologique, 111(1), 43–64, doi:https://doi.org/10.1177/0759106311408891.

Schlegel, K., & Mortillaro, M. (2019). The Geneva emotional competence test (GECo): An ability measure of workplace emotional intelligence. *The Journal of Applied Psychology, 104*(4), 559–580. https://doi.org/10.1037/apl0000365.

Schmidt, C. T., Venkatesha, S. G., & Heymann, J. (2014). *Empirical insights into the perceived benefits of agile software engineering practices: A case study from SAP.* Paper presented at the companion proceedings of the 36th international conference on software engineering, Hyderabad, India,

Schuller, D., & Schuller, B. W. (2018). The age of Artificial emotional intelligence. *Computer, 51*(9), 38–46. https://doi.org/10.1109/MC.2018.3620963.

Schutte, N. S., Malouff, J. M., & Thorsteinsson, E. B. (2013). Increasing emotional intelligence through training: Current status and future directions. *International Journal of Emotional Education, 5*(1), 56–72.

Serrador, P., & Pinto, J. K. (2015). Does agile work? — A quantitative analysis of agile project success. *International Journal of Project Management, 33*(5), 1040–1051. https://doi.org/10.1016/j.ijproman.2015.01.006.

Shadish, W. R. (2010). Campbell and Rubin: A primer and comparison of their approaches to causal inference in field settings. *Psychological Methods, 15*(1), 3–17. https://doi.org/10.1037/a0015916.

Sharp, H., Baddoo, N., Beecham, S., Hall, T., & Robinson, H. (2009). Models of motivation in software engineering. *Information and Software Technology, 51*(1), 219–233. https://doi.org/10.1016/j.infsof.2008.05.009.

Shih, S.-P., Lie, T., Klein, G., & Jiang, J. J. (2014). Information technology customer aggression: The importance of an organizational climate of support. *Information & Management, 51*(6), 670–678. https://doi.org/10.1016/j.im.2014.06.001.

Stuart, E. A. (2010). Matching methods for causal inference: A review and a look forward. *Statistical Science, 25*(1), 1–21. https://doi.org/10.1214/09-STS313.

Sukys, S., Tilindienė, I., Cesnaitiene, V. J., & Kreivyte, R. (2019). Does emotional intelligence predict Athletes' motivation to participate in sports? *Perceptual and Motor Skills*, 31512518825201.

Sun, J. (2005). Assessing goodness of fit in confirmatory factor analysis. *Measurement and Evaluation in Counseling and Development, 37*(4), 240–256. https://doi.org/10.1080/07481756.2005.11909764.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed., Vol. Book, Whole). Boston: Pearson Education.

Takpuie, D., & Tanner, M. (2016). Investigating the characteristics needed by scrum team members to successfully transfer tacit knowledge during agile software projects. *Electronic Journal of Information Systems Evaluation U6, 19*(1), 36.

Tan, C.-H., & Teo, H.-H. (2007). *Training future software developers to acquire agile development skills. (Vol. 50, pp. 97–98)*. New York: ACM.

Thomas, C. L., Cassady, J. C., & Heller, M. L. (2017). The influence of emotional intelligence, cognitive test anxiety, and coping strategies on undergraduate academic performance. *Learning and Individual Differences, 55*, 40–48. https://doi.org/10.1016/j.lindif.2017.03.001.

Thorgren, S., & Caiman, E. (2019). The role of psychological safety in implementing agile methods across cultures. *Research-Technology Management, 62*(2), 31–39. https://doi.org/10.1080/08956308.2019.1563436.

Trivellas, P., Gerogiannis, V., & Svarna, S. (2013). Exploring workplace implications of emotional intelligence (WLEIS) in hospitals: Job satisfaction and turnover intentions. *Procedia - Social and Behavioral Sciences, 73*, 701–709. https://doi.org/10.1016/j.sbspro.2013.02.108.

Troth, A. C., Jordan, P. J., & Lawrence, S. A. (2012a). Emotional intelligence, communication competence, and student perceptions of team social cohesion. *Journal of Psychoeducational Assessment, 30*(4), 414–424. https://doi.org/10.1177/0734282912449447.

Troth, A. C., Jordan, P. J., Lawrence, S. A., & Herman H. M, T. S. E. (2012b). A multilevel model of emotional skills, communication performance, and task performance in teams. Journal of Organizational Behavior, 33(5), 700–722, doi:https://doi.org/10.1002/job.785.

Tsapeli, F., & Musolesi, M. (2015). Investigating causality in human behavior from smartphone sensor data: A quasi-experimental approach. *4*(1), 1-15. https://doi.org/10.1140/epjds/s13688-015-0061-1.

Van Rooy, D. L., Alonso, A., & Viswesvaran, C. (2005). Group differences in emotional intelligence scores: Theoretical and practical implications. *Personality and Individual Differences, 38*(3), 689–700. https://doi.org/10.1016/j.paid.2004.05.023.

VersionOne. (2018). *12th annual state of agile report*. Alpharetta: CollabNet.

Vinekar, V., Slinkman, C. W., & Nerur, S. (2006). Can agile and traditional systems development approaches coexist? An ambidextrous view. *Information Systems Management, 23*(3), 31–42. https://doi.org/10.1201/1078.10580530/46108.23.3.20060601/93705.4.

Weilemann, E., & Brune, P. (2015). Less distress with a scrum mistress?: On the impact of females in agile software development teams. In*, 2015* (Vol. 28-, pp. 3–7): ACM. https://doi.org/10.1145/2811681.2811682.

Wong, C., & Law, K. S. (2002). The effects of leader and follower emotional intelligence on performance and attitude an exploratory study. *The Leadership Quarterly, 13*(3), 243–274. https://doi.org/10.1016/S1048-9843(02)00099-1.

Woszczynski, A. B., Dembla, P., & Zafar, H. (2016). Gender-based differences in culture in the Indian IT workplace. *International Journal of Information Management, 36*(4), 507–519. https://doi.org/10.1016/j.ijinfomgt.2016.02.002.

Tan Trung Luong is a fourth-year DBA student at the School of Management, University of Bradford, UK, and works as a Solution Architect for an international IT-company. He received his diploma in Business Administration from the University of Mannheim, Germany. His research interests include agile project management and Emotional Intelligence.

Uthayasankar Sivarajah is a Reader in Technology Management and Circular Economy and the Head of Business Analytics, Circular Economy and Supply Chain (BACES) Research Centre in the School of Management at University of Bradford, UK. His broad area of research interest and expertise is interdisciplinary focusing on the use of emerging digital technology for the betterment of society, be it in a business or government context. He actively publishes in leading high impact factor journals such as Journal of Business Research, Computers in Human Behaviour and Government Information Quarterly. Hisresearch has also been featured in reputable media/trade publications such as Computer Weekly, Public Sector Focus, London School of Economics academic blog etc. To date, he has been involved as Principal and Co-investigator in over £3 million worth of Research and Innovation and consultancy projects funded by national, international funding bodies and commercial organisations. Some of the notable funders have been the European Commission (FP7, H2020, Marie Curie), Qatar National Research Fund (QNRF), Innovate UK/DEFRA and British Council focusing on projects addressing business and societal challenges surrounding themes such as Blockchain use in Financial Services, Smart Waste and Cities, Energy efficient data centres, Social innovation and Participatory Budgeting. He has a PhD in Management Information Systems from Brunel University London, a MSc with Distinction in Management from Cass Business School (City University, London) and a first-class BSc (Hons) in Business and Management specialising in Computer Sciences from Brunel University London. He is a Fellow of the UK Higher Education Academy (FHEA), a member of the British Academy of Management (BAM) and Association for Information Systems (AIS).

Vishanth Weerakkody is currently the Deputy Dean for the Faculty of Management, Law and Social Sciences and Professor of Digital Governance at University of Bradford. Prior to this, I was a Professor of Digital Governance at the Business School in Brunel University London. My current research is multidisciplinary and centred around public sector policy implementation, process transformation through digital government, social innovation and the implementation, diffusion and adoption of disruptive technologies within a smart city – services context. Focusing on the evolving role of technology, I closely follow and critique digital enabled service transformation efforts in government. My passion for solving societalproblems through research and innovation together with a vast network of collaborators from both academia and industry has allowed me to attract over £25 million of R& D funding over the last few years from the EU, ESRC, Qatar Foundation, British Council and UK Local Government. Given the changing landscape of UK within Europe, I am particularly passionate about research and innovation to tackle the societal challenges prioritised in our National Industry Strategy, including the use of emerging technologies to transform health and social care and using community led innovation to deal with increasing levels of scarcity and poverty.