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‘Going Agile’: Exploring the use of project management tools in fostering psychological safety in group work within management discipline courses

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Abstract

While psychological safety is widely acknowledged to be a crucial factor in determining how well teams function, little attention has been paid to this phenomenon in management education and HE more broadly. This highlights an important gap, given the ‘thorny’ nature, and pervasive use, of group work. We contribute the first examination of an HE intervention to increase psychological safety. Specifically, through a two-phase mixed methods approach (pre/post surveys and focus groups, student diaries), we examine the implementation of Agile project management principles in both an undergraduate and postgraduate digital marketing course (total n = 131). The findings illustrate that the intervention increased psychological safety along with team-performance, group learning, interpersonal communication and creativity, whilst also reducing the free-rider problem. The study provides three contributions. First, we extend knowledge of psychological safety by showing it can be fostered through interventions providing two core antecedents (supporting facilitation and a cohesive framework). Second, we build knowledge of psychological safety in education by evidencing a greater breadth of positive outcomes, which until now has been mostly limited to knowledge development. Third, we expand understanding of implementing group work interventions in management, providing five important considerations for educational practitioners.

Introduction

In higher education (HE) and specifically management courses, group work is ubiquitous, acting as an important contributor to students' course grades, and giving rise to a range of pedagogical benefits such as enhanced team workings skills, group learning, and cultural appreciation (Hoffman and Rogelberg 2001; De Vita 2001; Analoui, Sambrook, and Doloriert 2014). However, when group work is announced in class it is often met with discontent and murmurs similar to those of backbench politicians, especially when these grades contribute towards the overall degree classification. Similar disdain is often held by staff (Chapman et al., 2010). Such resistance is generally fuelled by the widely acknowledged pitfalls of group work including 'free riding', lack of coordination, social loafing, destructive group dynamics and general lack of motivation (McCorkle et al, 1999; Aggarwal and O'Brien, 2008; Freeman and Greenacre, 2011). Group work, in particular how it is structured, managed and facilitated is considered a ubiquitous issue within HE; a thorn in the side of student satisfaction yet conversely of paramount importance in an increasingly competitive HE marketplace (Takeda and Homberg, 2014; Nixon; Scullion and Hearn, 2018; Crook and Nixon, 2019). Kamau and Spong (2015) argue that there is little research on potential interventions to improve matters, calling for immediate attention in this area. It is here we intend to contribute, with an intervention focussed on fostering group psychological safety.

An article titled "What Google Learned From Its Quest to Build the Perfect Team" published in the New York Times concludes it is key that team members feel psychologically safe (Duhigg, 2016). Psychological safety pertains to the perceived consequences from taking risks in interpersonal settings (e.g., Edmondson 1999). Extant research, conducted in workplaces, has shown that increased psychological safety promotes "speaking up", team performance (Edmondson and Lei, 2014) and reduces team learning anxieties (Schein 1996). It also reduces fear in admitting mistakes and increases confidence in asking for help (Newman, Donohue and

Eva 2017). Albeit a crucial construct in understanding industry-teams, psychological safety has been largely unexplored in examining student group working, though a number of studies support its importance in helping improve educational processes (e.g. Närhi, Kiiski and Savolainen, 2017). Here we propose an intervention based on the application of an industry leading project management paradigm ('Agile') to increase psychological safety in student groups.

Agile working is now widely practiced in business. Propagated by software engineers for well over a decade, it stimulates a more dynamic and democratic approach to teamwork/project management than more traditional management structures allow. As Hardy's (2016) New York Times article states "Whether you like it or not, your boss may want you to start acting more like a programmer." Specifically, Marketing Week (2019) stated recently "when marketers take cues from software developers and start working in an 'agile' way it can offer big benefits to ways of working". A definition frequently quoted by organisations promoting Agile working, such as the NHS and Unilever is: "Agile working is about bringing people, processes, connectivity and technology, time and place together to find the most appropriate and effective way of working to carry out a particular task. It is working within guidelines (of the task) but without boundaries (of how you achieve it)." (Allsopp 2009, The Agile Organisation homepage). In other words, Agile encourages flexible working, continuous improvement and team responsibility, focusing on performance and outcomes which are mutually beneficial to the worker, their team and ultimately the organisation.

To enable Agile as a value system to flourish (Agile Manifesto, Beck et al., 2001), process frameworks have been developed to facilitate implementation, the most popular of which is Scrum due to its simplicity of implementation and focus on teamwork. Led by a "Scrum

Master”, the team work on an identified problem (or opportunity). Via a series of “sprints” they evaluate possible solutions, build/implement changes, measure success and move on to consider the next stages (or sprints) in this continuous improvement loop (Scrum.org 2021). The Scrum approach to Agile working enables the solving of problems through complex adaptive systems methods and ultimately should lead to continuous improvement in both addressing the issue/opportunity as well as improving the confidence within the team itself. Adoption of Scrum has been found to increase psychological safety (especially in cross cultural groups) as well as other benefits such as increased stakeholder satisfaction (Stray, Fægri and Moe, 2016; Dixon, 2017) and will therefore, be the process adopted in this research.

Our study adds to the limited existing knowledge exploring the implementation of Agile in improving student group working in HE. A key study by Cubic (2013) demonstrated that “significant learning” was achieved using an Agile approach to HE group work which could have life-long benefits to students. However, Cubic (2013) did acknowledge that team-based issues still emerged during implementation. This study will further explore team dynamics through the explicit fostering of psychological safety. It has two broad aims, first to extend knowledge of psychological safety with student teams in HE, specifically on antecedents and outcomes. Second, in response to calls (Cubic 2013; Kamau and Spong 2015), we intend to contribute new knowledge on the effectiveness and implementation of project management methodology-based interventions to improve student group working in HE (specifically in the case of management discipline courses).

Literature review

Group work in higher education

Group work has been found to increase appreciation of diversity, critical problem solving, social development and experiential learning, leading to improved learning outcomes (MacGregor et al., 2000; Cheng, Lam, and Chan, 2008). However, McCorkle et al. (1999, p.106) also stress that with the “Good”, comes the “Bad, and the Ugly” highlighting four key issues of group work. 1) Free riding/social loafing, which leads to what Kerr (1983) terms the “sucker effect”, as non-contribution by certain members breeds retaliation as others decide to reduce their effort (see also Kamau and Spong, 2015). 2) Inadequate reward for an individuals’ effort within the group grade. 3) Transaction costs associated with functioning as a team, e.g., travel, meeting times, communication, administration. 4) Integrative learning problems where students are asked to do a conjunctive task (i.e., all students are meant to collaborate on all aspects of the task) yet treat it as an additive task (i.e., divide the tasks and work independently), leading to inconsistency and lost project flow (Giles et al. 2003). Furthermore, different perceptions in skills and attitude towards group work are often linked to cultural diversity (Elliot and Reynolds 2014) and gender differences (Pyror, 1995; Takeda and Homberg, 2014).

In addition, group work is known to be problematic where group members do not have a pre-existing relationship (Kahn, 2014) creating particular apprehension for students transitioning into HE (Pampaka, Williams and Hutcheson, 2012). Such issues with group work have led to negative emotions being felt by group members (New, 2012). Working commitments outside of university have also been found to put strain on group working (Alessandro and Volet, 2012). The issues outlined have spurred a small but growing body of work investigating possible interventions to improve group working in HE which sit alongside a number of studies that focus on primary level education (e.g. Harwood, 1995; Baines, Blatchford and Chowne, 2007). Diamond (1972) intervened by assigning leaders and providing advice on how to best

structure their efforts which led to increased motivation and ability to problem solve. Brigman and Webb (2007, p.1) adopted a counselling approach centred on supporting group members' interpersonal, cognitive, social and self-management skills. They conclude that groups should: "Go slow to go fast", initially prioritising a solid foundation of group cohesion and trust. Wood (2003) found that giving students greater ownership of their projects increased group functioning. Kamau and Spong (2015) intervened by providing a workshop and consultations as well as a defined leader and use of project tools (a group log and group contract). Their controlled experiment showed these interventions improve overall cohesion and performance through enhanced accountability, responsibility and group decision-making. Harding (2018) tested an intervention of "flocking" where student groups are established due to their schedule and the amount of time they were able to spend on the project, finding these group outperformed self-selected groups. Though the outlined studies provide valuable contributions, psychological safety has not been explicitly considered.

Psychological safety

Psychological safety refers to the perceived consequences from taking risks in interpersonal settings (e.g., Edmondson 1999). At a group-level psychological safety has long been found to increase group performance (Edmondson, 1999). More recently, studies have shown that psychological safety leads to increased performance including team learning, experimentation, risk-taking, new practice production, and divergent thinking (Tucker, 2007; Huang, 2008). Furthermore, psychological safety is known to be key in establishing cooperation and building trust (Tjosvold et al. 2004; De Jong and Elfring 2010). Though psychological safety is crucial for collaborative projects, Edmondson and Lei (2014) concludes it "does not emerge naturally" and must be fostered (p.39). Newman, Donohue and Eva (2017) in their systemic review of

workplace psychological safety provide five key antecedents: supportive leader and organisational behaviour, relationship networks, group characteristics (e.g. similarity amongst members) and differences within the team (e.g. working styles).

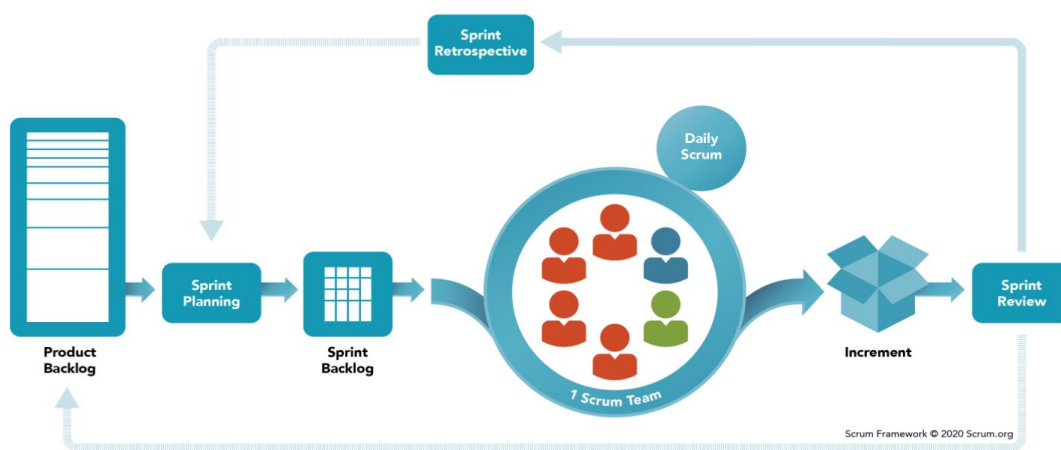
Though psychological safety is well researched in the workplace, little attention has been given to the educational context. Mu and Gnyawali's (2003) survey of enablers of student team effectiveness found that task conflict had a negative impact on knowledge development and that this was moderated by psychological safety (see also Xu and Yang, 2010). Additional studies have suggested psychological safety increases when there is greater perceived peer and tutor support (Schepers et al., 2008) or when educators use smiley 😊 emojis in communication with HE students (Marder et al., 2019). Further, psychological safety has been found to aid functioning of interdisciplinary medical student teams (Stalmeijer et al., 2007). In a primary education setting, psychological safety has been suggested as an outcome of initiatives to reduce disruptive behaviour (Närhi, Kiiski and Savolainen, 2017). At present no existing research has examined the impact of interventions on psychological safety in HE student groups.

Scrum: an Agile methodology

According to (Rigby, Sutherland and Takeuchi, 2016, p.1) "Agile innovation methods have revolutionized information technology [...*having*] greatly increased success rates in software development, improved quality and speed to market, and boosted the motivation and productivity of IT teams." "Going agile" means an organising unit (e.g., firm, team) adheres to a set of principles including self-organisation, flatter hierarchies, employee empowerment,

customer focus, decentralized decision-making, coordination characterized by self-integration and being adaptive to changing environments (Daft and Lewin, 1993). Though some industries beyond software development have been cynical, in marketing it is increasingly thought of as the “real deal” (Marketing Week, 2019). Although leadership is still important (e.g., via a “Scrum Master” as Facilitator), decision-making is owned by the team rather than relying on, or being answerable to, one or several individuals (Avolio, Walumbwa and Weber, 2009). In essence, Agile provides a paradigmatic shift away from traditional project delivery (e.g., Waterfall), where all tasks are detailed at the outset and workers stick rigidly to a leader’s plan. Instead, more dynamic, co-created processes respond to environmental changes as teams work in small steps with an onus on reflection and continuous improvement.

Within the Agile paradigm, a few specific methodologies exist, of which Scrum is the most adopted (Denning, 2015).



Scrum Framework: Scrum.org

The Scrum framework (outlined above) contains a number of stages including the Product Backlog (“[a] list of the work to be done in order to create, maintain and sustain a product”, Scrum.org); Sprint Planning (a time limited event that “serves for the Scrum Team to inspect

the work from the Product Backlog that's most valuable to be done next and design that work into Sprint backlog", (ibid)) and a Sprint Backlog which forms the plan/overview of work required to achieve the Sprint's aims. Sprints are high-productivity work cycles that may vary in length from two to four weeks (Sommer et al., 2015). The Scrum Team itself is "a self-organizing team" often consisting of a Product Owner, responsible for overall resource delivery, delivery team members (accountable for managing, organizing and delivering every Sprint) and a Scrum Master ("accountable for guiding, coaching, teaching and assisting a Scrum Team and its environments in a proper understanding and use of Scrum", ibid). A Scrum Master, not necessarily a member of the technical team, takes on the role of facilitator of the Scrum process (Holtzhausen and Klerk, 2018). The Daily Scrum is a short meeting held by the Scrum Development Team to review previous work, plan ahead briefly and overall maximise the team's ongoing performance. The Sprint Review considers the incremental benefits of the Sprint/s so far, looping back to create a dynamic process which enables constant product improvement alongside building team engagement. Finally, the Retrospective "serves for the Scrum Team to inspect the past Sprint and plan for improvements to be enacted during the next Sprint" (ibid).

Recent studies suggest that practicing Scrum techniques may increase psychological safety through fostering better interpersonal knowledge of each other's strengths and weaknesses (Dixon 2017; Holtzhausen and Klerk, 2018), as well as providing a less judgmental working environment (Stray et al., 2016). Such benefits, though, are more likely to arise when a Scrum Master is present (Holtzhausen and Klerk 2018). An adaptation of the Scrum process was utilised in this study and will be outlined in the Methodology.

Research Questions

Group work in higher education may bring benefits but this is often overshadowed by the pitfalls leading to calls for urgent research into interventions to improve HE group work processes (e.g. Kamau and Spong 2015). Here we will design and implement interventions within group work processes using the Scrum methodology. Initial support for Scrum in HE groups is provided in the study of computer science (Satzinger, Batra, and Topi, 2007) and within the management discipline i.e., a specific Agile project management course where the coursework involved Wikis (Cubric 2013). Our research extends this work by trialling Scrum in management discipline courses where the group project is less focussed on technical processes/software and therefore, extending the usage for which Scrum was initially intended.

Our research intends three theoretical contributions. First, we will provide exploration of interventions to improve psychological safety within student group work in management education and HE more broadly, shedding light on potential antecedents of any improvement. Thus we propose the following two research questions;

RQ1: Does Agile working improve psychological safety within group work ?

RQ2: Why does Agile working improve psychological safety within group work ?

Second, unlike prior studies in education that have focussed largely on knowledge development as the outcome of psychological safety, we will take a more comprehensive approach, inspired by understanding from industry teams. Thus, we will examine potential effects of psychological safety on team performance, group learning, interpersonal communication and

creativity, whilst also exploring whether it can help reduce the free-rider problem. We will therefore answer the following question;

RQ3: What are the outcomes of increased psychological safety within group work ?

Third, we intend our intervention to extend work by Cubric (2013) providing important insights into the implementation and success of industry-based project management paradigms within management discipline group work. More specifically, we will provide specific knowledge with regards to Agile interventions (outside of computer science projects). It is here our core practitioner implications are located.

Methods

In common with education scholars (e.g. Caspersz and Olaru, 2017), a concurrent triangulation design, mixed method approach (pre/post survey and focus groups, as well as an Agile diary) was adopted (Creswell et al., 2003). This involved simultaneous collection of both quantitative and qualitative data before and after the intervention which was analysed simultaneously by different members of the research team. Findings were then consolidated, with conclusions drawn through investigator triangulation (Denzin, 2007). The research was conducted between the 10th January and 5th of April 2019, within two digital marketing modules comprising 81 final year UG and 48 PG students both run at a UK HE Business School, contributing to business related degrees. The group project was the same in both classes, contributing 40% of the overall course grade, and running over approximately eight weeks.

The set task was to create a short video (< 2 minutes) with viral potential and submit a document supporting its virality (2,500 words). Each component was awarded 17.5% of the overall 40%. For the UGs the remaining 5% was split equally in marks for peer-assessment (through an online tool at the end of the project) and an individual Agile diary (explained below). Furthermore, UGs were given the option to select their own group, with those who did not choose to select being randomly allocated. PGs were randomly allocated because random selection is the requirement for group work at PG level at the school the research was being conducted. However, this is not the case at UG, where the Digital Marketing course has traditionally run with self-selected groups, a method of allocation that is favoured by final year UGs.

For the PGs the whole of the remaining 5% was allocated to the individual Agile diary as peer assessment is not used at this level on marketing related courses. It is also important to note that the majority of the UG class were native English speakers while the PG group who were predominantly non-native English speakers.

Intervention

The intervention involved five phases (Table 1 below). The initial intervention was carried out by the Course Organiser with subsequent stages led by one of three certified Agile coaches who work in the institution's professional services team who were acting as remote "Scrum Masters" to help facilitate the Scrum process. The coaches devised the intervention in conjunction with the Course Organiser, adapting Scrum for the parameters of a HE project.

Table 1: Scrum intervention for UG and PG digital marketing projects

[Insert Table 1]

The Scrum methodology and intervention were adapted to acknowledge that students were usually working with each other for the first time, on a relatively short viral video project, which would be balanced alongside other University work. Due to the shorter project scenario here (which had far less complexity than would be the case in professional technical settings), the focus was not on Project Backlog, Sprint Planning or Sprint Backlog but rather simplified to focus on Daily Scrums (self-directed and at times of their choosing) which allowed them to ‘check-in’ with one another regarding progress whilst balancing their other course work priorities. With fewer meetings and in the context of this relatively short coursework, project iterations and increments were not expected to be achieved as regularly as would have been the case in a typical Scrum cycle. Students were also asked to complete diaries throughout the process, the intention being to help them reflect on the methodology in question, in ways which would help inform their future practice and focus group contributions. These functioned also as “mini-retrospectives”, allowing students to consider their own performance within their projects and how they might re-enter the sprint process in light of their individual reflections.

Quantitative phase: Pre and post intervention surveys

Differences in psychological safety and the key outcome variables caused by the intervention were assessed through a within-subject design known to increase validity in intervention studies (Rogers and Graham, 2008). The initial and final survey were realised in Week 1 and Week 10 respectively, with participation incentivised through a prize draw. Although UG and PG end course sizes were 81 and 48 correspondingly, at the release of the pre-survey only 41

UG and 43 PG students were registered and received the survey link. Final year UG students at this institution often register within the first week of a course.

The initial survey required students to reflect back on the most recent piece of group work undertaken at the institution. The following measures were then reported along a 7-point Likert scale (Strongly Disagree to Strongly Agree), with cronbachs alpha (α) provided as a measure for internal consistency. A full list of items is provided in Appendix A. *Team psychological safety*, involving 6-items e.g., item 2 “Members of this team were able to bring up problems and tough issues” ($\alpha = .69$). *Team performance*, entailing 4-items e.g., item 2 “This team does superb work” ($\alpha = .88$). Both the above measures were adopted from Edmondson (1999). *Interpersonal Communication*, was measured using 2-item e.g., item 1 “People talked openly and freely in my group” ($\alpha = .81$) amended from Peltokorpi (2004). *Learning behaviour*, was assessed through 3-items e.g., item 2 ‘Information from team members is complemented with information from other team members’ ($\alpha = .67$), adapted from (Van den Bossche et al., 2006). *Creativity in group work*, was measured through 4-items e.g., item 4 “Generated novel but operable work-related ideas” ($\alpha = .87$), adopted from Ettlíe and O’Keefe (1982). *Free-rider problem* entailed 4-items e.g. item 1 “Everyone did an equal amount of work” ($\alpha = .93$) taken from Pfaff and Huddleston (2003). Please note that higher scores portray a lower free rider problem. Participants, also provided demographic data, including whether they were a native English speaker.

To understand the potential impact of the intervention a post intervention survey was conducted involving the same measures as above but answers were based on the specific Scrum interventions in the group project. In addition, open-ended answer boxes were provided for comments on the intervention and were triangulated along with other qualitative data.

A total of 33 participants completed both surveys including 23 UGs, 10 PGs, 24 Females, 11 Males, 23 native English speakers and 10 non-native English speakers. Given, the relatively small sample, bootstrapping was used. Bootstrapping applies a resampling technique that involves repeatedly taking small samples, with replacements, estimating statistics, and taking the average of the estimated statistics. Overall, this allows for more accurate estimates of parameters than analysing the total number of existing data points alone. (Quintana and Maxwell, 1994; Berkovits, Hancock and Nevitt, 2000).

Qualitative phase: Pre and Post Focus groups and Agile diary

Four UG and five PG focus groups (3-6 students in each) were held before and after the Agile interventions respectively. Their aim was to foster social interaction and cross-group reflections on previous group work assignments compared to the current project (Wilkinson 1998). Furthermore, individual reflective data was gathered via bi-weekly diaries to ensure dynamic and more immediate emotional responses to the project were captured and to ensure nothing was forgotten or overlooked during the post-intervention focus groups (Butcher and Eldridge 1990). Following Zimmerman and Lawrence-Weider (1977), three questions were used to stimulate diary entries; 1. What did we do well? 2. What did we learn? 3. What should we do differently next time? A thematic analysis was used to analyse the qualitative data (Braun and Clarke, 2006)

Findings

Our findings section will be structured around the three research questions proposed, with answers supported by findings triangulated between the different research phases.

RQ1: Does Agile working improve psychological safety within group work ?

First, Harmann's common factor test was run to assess for potential common method bias in both surveys, both scored below the threshold of .5. Next, a series of paired sample t-tests were conducted to assess differences in *psychological safety* to answer RQ1, as well in the five other outcome variables pre versus post intervention. Though the latter analysis is not needed to address RQ1 directly it is pertinent to examine the main effects of the intervention on all key outcome variables. Bootstrapping was set at the standard amount of 5000. Significant differences were found for all variables, illustrated in Figure 1 and Table 2.

[Table 2 here]

[Figure 1 here]

The results illustrate that the intervention successfully improved psychological safety compared to the participants' prior most recent group work experience, as well as having significant positive effects on the further five outcomes measures. Our qualitative findings provide further that indeed working Agile within group work increased psychological safety, which is highlighted in discussion of the antecedents/outcomes of psychological safety to follow.

RQ2: Why does Agile working improve psychological safety within group work ?

Two key antecedents emerged from the qualitative data that were understood to be central antecedents for the increase in psychological safety that arises through Agile working – the *Cohesive Framework* and *Supportive Leadership*.

Cohesive Framework: The positive internalisation of Agile principles by students underpins our first antecedent which relates to the importance of adopting a guiding philosophy which promotes a psychologically safe working environment. It was evident from the pre-intervention focus groups that some students saw Agile very positively and as a potential solution to previous group work issues as, *'Group work as a whole is very risky...the spectrum is massive from how successful it can be... Agile would help a lot to close that'* (UG POST 1). The regular, structured and reflective Agile meetings engendered improvements in how students experienced the group work process in terms of psychological safety. Improved communication (PG POST 1) and group 'bond[ing]' (UG POST 1), increased a shared sense of responsibility and respect (UG POST 1). However, some students expected more specific task-orientated, implementation guidance. As a result, given the assignment's time constraints and embedded group work practices, many reverted to previous group work practices, stating *'we didn't always use the Agile process to its full potential'* (Diary).

Supportive Leadership: The presence of a Scrum Master impacted the student experience with the project and Agile itself, elevating feelings of psychological safety. Specifically, the presence of a facilitator created a safe, less judgmental space for conversation. They were seen as an independent authority figure; *'someone other than a group member... [who] really helped us to ...share'* (PG POST 1); they *'encourage everyone to speak up and to voice their opinion'* (UG POST 1). The facilitator was also considered to reduce social risks around some difficult aspects of communication. They were seen as *'enough of a safe space that it's ok to voice your*

frustrations' (PG POST 3). In situations where students knew each other prior to the project there was a fear of being judged a *'bore'* or *'bossy'* (UG POST 2) if they attempted to communicate a need for focus within the group process because – as they saw it – *'there was almost a social side to it as well'* (UG POST 2). This highlighted a real sense of interpersonal risk that was present for students around the practices of group work. Facilitators were valued for their role in helping to *'steer'* conversations negating otherwise problematic behaviours such as lack of focus and in-team joking, e.g., *'what's good about the facilitating is you can't really have that banter'* (UG POST 1).

RQ3: What are the outcomes of increased psychological safety within group work ?

To test the relationship between the increase in psychological safety and our key outcomes variables we created difference variables (i.e., post intervention minus pre intervention mean) for psychological safety and each of the five outcome variables. The difference variable for psychological safety was regressed individually against the other five differenced outcome variables to support relationships suggested in the literature. Psychological safety was found to significantly predict all variables (standardized beta (β) ranging .302 to .511, $p < .05$ – one-tailed) apart from the free rider problem ($p = .165$). Further non-parametric testing of medians for all six difference variables was carried out to assess differences for gender, level of study (UG vs. PG) and whether the participants were native English speakers or not. However, no significant differences were found ($p > .05$).

While these results suggest important outcomes resulting from an increase in psychological safety arising from Agile working, we acknowledge the simplicity of this quantitative analysis in our limitations. However, the relationships quantitative findings are supported by our

qualitative analysis. The qualitative data revealed psychological safety was associated with improvements in: team performance; interpersonal communication, team learning, creativity and reduction in free-riding.

Interpersonal Communication: Communications were broadly improved through intervention, with students explicitly highlighting the value of regular and early meetings in this regard. Literature underlines the importance of speaking and sharing openly as central to the experience of psychological safety (Newman et al, 2017) and the experience of students demonstrated these behaviours; becoming more *'confident'* (Survey) to *'voice [my] opinion'* (Survey) and acknowledging the role of meetings in allowing them to *'have a chance to speak openly'* (Survey).

Despite improvements in communications, there was evidence of psychological risk for some around communication even in the context of supervised intervention. Being able to engage in constructive confrontation is a recognised element of psychological safety (Edmondson, 1999) and for some giving honest feedback to their peers was experienced as problematic with them fearing potentially *'upset[ting]...feelings'* (PG POST 3) or *'target[ing] someone'* (PG POST 3).

Free-Rider problem: The free-rider problem was acknowledged as an associated risk with group work. It is perceived as *'easy to fly under the radar'* and *'achieve the same grades as everyone else'* (PG POST 3). In this intervention, free riding was experienced by some groups and not others. Those who did not experience it talked about *'being on the same page'* (UG POST 1) as their group in terms of commitment to the task as well as highlighting the Agile framework's *'small deadlines...making people more responsible for their tasks'* (UG POST 2).

The role of the facilitator was also discussed in *'disciplining'* terms with students from more productive groups noting small behavioural improvements as a result of their presence. Students speculated that a facilitator's presence would mitigate freeloading behaviours in groups that were less committed.

In cases where free-riding was experienced students struggled to raise concerns due to social and course performance risks. Project context and stress can arguably hinder the ability of those within a group to open up lines of communication in such circumstances. In such cases the free-rider problem was not mitigated by Agile: *'[Agile] is that everyone should be accountable for the work they're doing....I didn't get that'* (PG POST 3). It should be noted that the groups that reported no problems chose their own groups and were culturally homogenous. Those which did were cultural more diverse, supporting prior work on cultural complexity and free-riding (McCorkle et al., 1999).

Performance: Performance was broadly improved for students. The forms of reflection encouraged through the Scrum framework were typically new, particularly to the UG students, who acknowledged that *'standard group meetings'* would historically rarely follow such reflective patterns: *'[it is] highly unlikely that people are going to get together and go...what have we done well so far, what have we not done well'* (UG POST 1).

The reflective and iterative structure brought by the Scrum framework had a real impact for some. *'Mini deadlines'* (Diary); being able to *'visualise'* (UG POST 2) progress and handling a *'small amount of work'* (Diary) were all considered helpful towards improved performance – including early submissions. Having a clearer sense of what they needed to achieve through the framework helped with *'motivation'* and regular meetings helped them to *'keep on top of*

things' (UG POST 2). Importantly, as indicated above, the facilitator was a key part in building students' confidence to implement some of these ideas and practices where social risk was evident. For those groups who felt they did not apply Agile principles enough, there was evidence of lack of parity in performance within groups with some students *'fad[ing] into the background'* (PG POST 3) at crucial points.

Learning Behaviour: The implementation of the Scrum framework led to evidence of improvement in learning behaviours. A greater sense of listening and respect was evidenced through greater shared ownership and democracy within projects. Where previously students had experienced very controlling and domineering individuals within group work processes who tended to undermine their efforts and contributions, *'this one person...went back and changed a whole lot of the group project'* (UG POST 1), more cohesion and sharing of responsibility was evident, decisions were not *'down to personal opinion [but] down to group opinion'* (UG POST 1). This sense of open collaboration and respect is demonstrative of a perceived psychologically safe group environment (Edmondson, 1999).

Creativity: The qualitative work revealed a more limited picture of creativity in terms of novel project outcomes. There was clear evidence, however, that better quality relationships had developed and know-how shared across groups – both of which can be seen as mediating factors in the development of psychological safety (Edmondson, 1999). In addition, adaptability was evident: *'through the adoption of the Agile mind-set, team members learnt to expect change and thereby were open to the adaption of the project and its schedules'* (Diary). Interestingly, there was a sense that groups amended, evolved and created different ways of working together through this process – seeing value in innovative ways of operating. *'Effective meetings'* were facilitated through meeting less via online messages and *'more*

regularly in person’ and by *‘decid[ing] not to use phones’* (UG POST 1). Changing and evolving group practices was therefore an outcome.

Discussion

Triangulation of our findings present three contributions which will now be discussed, see Figure 2 for a summary. Our first contribution extends knowledge of psychological safety in management student group work and more broadly student collaborative learning in HE by showing this can be fostered through intervention. Precisely, we provide two core antecedents specific to this HE context and compel both scholars and practitioners intending to increase psychological safety in student group work to consider them. Firstly, *supporting facilitation* by a trained coach to support the creation of safe, less judgmental spaces for open conversation. We propose that in student groups, unlike industry teams, where hierarchies can be flat, that there is generally a lack of a supporting leadership role, considered critical for psychological safety (Edmondson and Lei, 2014). Our results concur with Chapman and Van Auken (2001) who found presence of an instructor associated with a better attitude towards group work. Facilitators, in this intervention, were found to fill this role, however we propose trained tutors or academic faculty engaged at a group level may also address this void (see Schepers et al., 2008). Unlike in industry, student groups arguably function outside of the overarching organisational philosophies, or well understood team-work paradigms, both known to support psychological safety (Newman, Donohue and Eva, 2017). Our subsequent antecedent is thus a *cohesive framework*, some form of philosophy, structure or guidance, which promotes cohesion and openness amongst members. In our case, Agile principles provided and formed the foundation for this.

Our second contribution, further extends knowledge of psychological safety in HE by evidencing a greater breadth of positive outcomes, which until now has been mostly limited to knowledge development (Mu and Gnyawali, 2003; Xu and Zhang, 2010). Specifically, our findings imply that psychological safety also increases; *team-performance*, *team learning*, *interpersonal communication* and *creativity* and helps reduce the *free-rider problem*. Though, the latter was supported by the qualitative phase caution must be given here due to the lack of significance, albeit approaching, in the quantitative phase. It is important to note the average grade for the viral video project increased a small amount for PG class compared to the prior year (72.56 to 75.09), with a very minor positive change for the UGs (66.16 to 66.60). We are extremely cautious of the limitations of this comparison yet the movement in grades somewhat supports the general success of the intervention and suggests no negative impact arose due to changing workload/practices. Overall, supported by knowledge from organisational research (e.g. Newman, Donohue and Eva, 2017), we urge academics using group work in HE, those examining group work processes generally or with the specific aim of cultivating the aforementioned positive outcomes, to strongly consider psychological safety at the point of theorisation and design. Our findings help support the underlying process delivering positive outcomes found by Cubric (2013) in their study of Scrum usage within an Agile project management class.

Our third contribution responds to Kamau and Spong (2015) pressing call for knowledge on group work interventions, particular with regards to Agile. Here at a broad level, we extend work by Cubric (2013) providing five important considerations for management education practitioners who intend interventions based on existing project management paradigms to optimise their implementation and ultimately the effectiveness of such interventions;

1) *Intervene early in student learning*, to minimise resistance to full immersion in the intervention brought on by embedded habitual group work practices and to avoid perceived time, and other personal and university related pressures, affecting performance. Therefore, it is suggested that Agile (or similar interventions) are implemented early within university studies, to deepen learning, create good habits and allow students to benefit throughout their degrees. 2) *Connecting concept to application*, was found to be key. Due to the time constraints of this project, students received a relatively short introduction to the concept which for some made it difficult to apply. Thus, it is imperative that ample time (potentially in the form of an additional course) and clarity of explanation is given. 3) *Nature of the project*, such as the length and type of task itself need to be carefully considered. Interventions which are to some extent iterative and reflective will be more beneficial for longer, higher involvement projects. 4) *Facilitation* at some point during the group work process is important to maintain positive working practices and support interventions, as supported by (Holtzhausen and Klerk, 2018). Although resource limitations will exist, we suggest that investment in a facilitator, at least for the initial meeting, will pay dividends throughout the entire process. 5) *Promoting industry transference* is an important motivator for intervention adoption. Students need to be clear of the added benefit of investing time in learning and applying new concepts. Potential methods for this involve, producing certificates or LinkedIn endorsements, guest lectures from professionals who work with Agile and encouraging reading of key industry publications that promote the importance of Agile in marketing (e.g. Marketing Week, 2019; Adweek, 2019)

Finally, our findings support the use of an Agile (specifically Scrum) based intervention in improving group work processes for non-tech focused projects and students. Beyond, the enhancement of group working itself, business students like many seeking careers in mainstream industries, crave transferable skills. Agile knowledge emerged from the data as

important for giving them an advantage in the graduate jobs market, a scenario reaffirmed by guest lecturers on the course from marketing agencies. Despite this, we must note that Agile, like other project management tools, cannot simply be applied to student group working in marketing and beyond. Procedures and methods need to be carefully amended in line with the nature of student working (e.g. lack of hierarchy), the projects themselves (e.g. short versus long term) and the wider quality and assurance frameworks and practices in operation in HEI's.

[Figure 2 here]

Limitations/future research

We acknowledge the following limitations. First, a modest sample of students in the quantitative phase limited our ability for a deeper statistical analysis. We are cautiously confident in our findings that suggest psychological safety is an antecedent for the positive outcomes presented, particularly as it is corroborated by the qualitative data. Nevertheless, further studies should reaffirm the relationship between intervention and outcomes using structural equation modelling, with psychological safety as a mediator. Second, our focus was on Agile, specifically Scrum, but given the similarity of implementation of mainstream project management tools, we propose that our findings have applicability to project management interventions more generally yet future research is required to assess other such tools (e.g. Waterfall, Kanban, Lean). Third, our study is limited to final year UG and PG students who, as discussed, have already established group working behaviours. Future studies should investigate interventions with students much earlier in their HE journeys and degrees. Fourth, our sample was largely business students, who had opted to study digital marketing which resonates a lot with the tech industry where Agile was born, thus they may be more inclined to

work in a technology related role and be more motivated to engage in the intervention. Subsequent studies should investigate the potential of project management tools in courses where student may not hold such an extrinsic motivation, e.g., retail.

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Table 1 illustrates the research and intervention phases of the Agile intervention

<i>Phase</i>	<i>Objective</i>	<i>Description</i>	
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Research	Initial data collection	Data was collected from focus groups and through an online survey from students.	Week 1
Intervention	Introduction	In the first lecture, students were introduced to the intervention and provided with a 15 min introduction to Agile working. Groups were confirmed after this session. It should be noted that a guest practitioner lecturer (Digital Marketing Agency CEO) presented at this lecture, expressing their view to the students of the need for knowledge of Agile going into industry.	Week 1
Intervention	Briefing session	Students received a one-hour masterclass on Agile including short exercises on group working, along with specific details of the intervention.	Week 1
Intervention	Facilitated meeting	Each group was offered a 30-minute facilitated meeting with an Agile coach present. The objective was to encourage members to reflect on past group work experiences, their own strengths and weaknesses and to discuss how they wished to work together resulting in a group contract.	Week 2-3
Intervention	Facilitated meeting	A 30-minute observed 'retrospective' meeting with the objective to encourage reflection on the project thus far and discuss desired changes to improve the work itself and the group's functioning.	Week 5-6
Intervention	Facilitated meeting	A final 30 minute facilitated 'sprint review' meeting. Here members were encouraged to inspect their work and reflect on what had been achieved thus far in reality compared with their prior expectations.	Week 8
Research	Final data collection	Focus groups, online survey and Agile diary data were collected to assess the intervention.	Week 9-10

Table 2. Summaries results for pairwise t-tests pre vs post intervention, estimates based on 5000 bootstraps, p valued (2-tailed).

Variable	Pre-intervention		Post-intervention		Comparison			
	\bar{x}	s.e	\bar{x}	s.e	\bar{x} - Diff	p value	LCI 95%	UCI 95%
<i>Team psychological safety</i>	4.879	0.142	5.528	0.147	-0.649	0.005	-1.052	-0.256
<i>Team performance</i>	4.303	0.253	5.455	0.216	-1.152	0.003	-1.773	-0.500
<i>Interpersonal communication</i>	5.061	0.237	5.924	0.218	-0.864	0.011	-1.409	-0.273
<i>Team learning</i>	4.737	0.188	5.758	0.202	0.202	0.000	-1.444	-0.576
<i>Team creativity</i>	4.697	0.204	5.856	0.172	0.172	0.000	-1.583	-0.735
<i>Free-rider problem</i>	3.402	0.306	4.879	0.280	-1.477	0.001	-2.061	-0.848

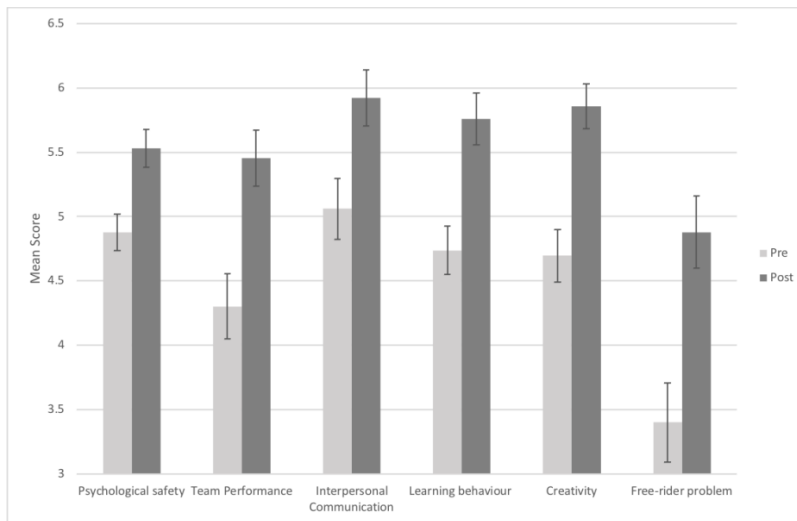


Figure 1 illustrates pairwise differences in mean scores for pre and post intervention measures along with standard error bars.

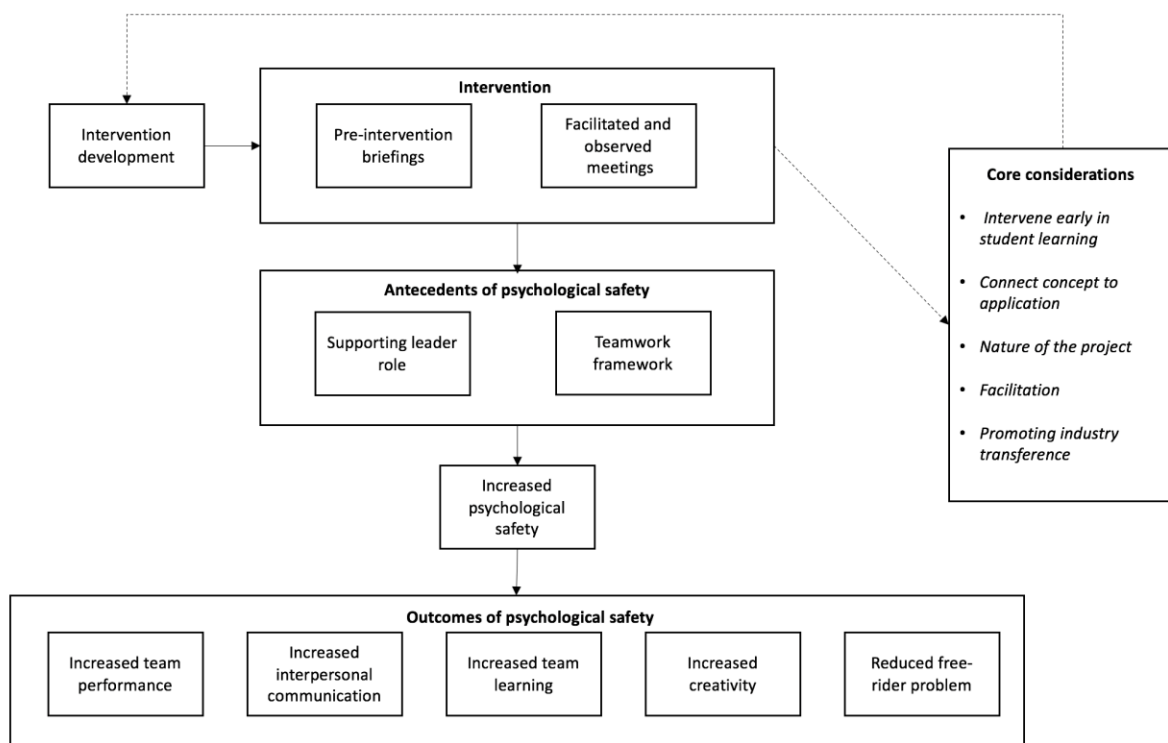


Figure 2 summarises contributions arises from triangulation of the findings.

Appendix A

List of items

Psychological safety $\alpha = .69$

Please state how much you agree/disagree with the following statements.

1. If you make a mistake, it is often held against you. (reverse)
2. Members of the group are able to bring up problems and tough issues.
3. People on this team sometimes reject others for being different. (reverse)
4. It is safe to take a risk in group work
5. It is difficult to ask other members of the group for help. (reverse)
6. My unique skills and talents are valued and utilized by the group

Team Performance $\alpha = .88$

Please state how much you agree/disagree with the following statements.

1. The team met or exceeded my expectations
2. The team did superb work.
3. Critical quality errors occur frequently in this team's work. (reverse)
4. This team kept getting better and better.

Interpersonal communication $\alpha = .81$

Please state how much you agree/disagree with the following statements.

1. People talked openly and freely in the group
2. There was frequent communication in my group

Learning behaviour $\alpha = .67$

Please state how much you agree/disagree with the following statements.

1. Team members listened carefully to each other
2. Information from one team member was complemented with information from other team members
3. The team tended to handle differences of opinions by addressing them directly

Creativity $\alpha = .87$

Please state how much you agree/disagree with the following statements.

1. The team demonstrated originality in the work.
2. The work that the group carried out was creative
3. The team took risks in terms of producing new ideas in doing job.
4. We generated novel, but operable work-related ideas.

Free-rider problem $\alpha = .93$

Please state how much you agree/disagree with the following statements.

1. Everyone did an equal amount of work.
2. Some people did more work than others.
3. Everyone did his or her share.
4. A few people did the majority of the work.

