

# The Effects on Social Support and Work Engagement with Scrum Events

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**Abstract**— One of the core values of the Agile Manifesto is “individuals and interactions over processes and tools.” Scrum implements interaction through key events (Sprint, Sprint Planning, Daily Scrum, Sprint Review, and Retrospective). There is limited work done on how these events influence perceived social support and work engagement. This paper examines perceived social support as a strengthening factor on work engagement in an agile work environment. Drawing upon the Job Demands-Resource Model, the research question is how do Scrum events relate to social support and what effect do they have on work engagement? We conducted an online survey with 132 Scrum professionals and analysed the data using structural equation modelling. Results show that the Scrum event Retrospective strengthened social support. Moreover, social support is positively related to work engagement. The research contributes to the limited empirical understanding on perceived social support as well as work engagement in an agile work environment. It provides companies with an understanding of the importance of Retrospectives as a Scrum event.

**Keywords**— Scrum Events, JD-R, Social Support, Work Engagement, Structural Equation Modelling

## I. INTRODUCTION

Agile working is increasingly becoming a focus of corporate practices. Scrum is the most widespread form of agile working [1], [2]. In Scrum work is done in short cycles, feedback loops are built in and a daily exchange is institutionalised [3]. Scrum thus provides several practices that are valuable in terms of work design. However, the effect of Scrum and the health consequences of these forms of work is relatively little studied [4], [5]. Work engagement is often studied within organisations, as it is a positive health indicator [6]. Healthy and thus high-performing employees are a key competitive advantage for organizations [7]. Since 2014 Health Promotion Switzerland has regularly determined key figures on strengthening and weakening factors, so-called job-resources and job-demands, and their effect on health and productivity. In 2020 one third of employees in Switzerland perceive more job-demands than job-resources in their working environment, to an extent that cannot be explained by random fluctuations [8]. A long-term imbalance between job-resources and job-demands, i.e., more job-demands than job-resources, is detrimental to health and can lead to stress [9]. On the other hand, resources can be beneficial and lead to work engagement and health [10].

Within the current work environments technical acceleration and work intensity are increasing. This is also shown by a cross-sectional study of project employees in the IT sector over three measurement points [11]. The assessment

of being able to relax after work and being able to keep up with the work over the long term is lower from one measurement point to the next. On the other hand, there is the principle of “sustainable pace”, which was introduced by Kent Beck as part of the twelve practices of eXtreme programming [12]. The agile manifesto offers an interesting approach to the strengthening and weakening factors of work with: “individuals and interactions over processes and tools” [3]. However, agility is not possible without appropriate situational working conditions [13]. The application of the popular and widely studied Job Demands-Resource Model (JD-R model) [14], shows the relationship between work and health and has been discussed and researched in agile work contexts [15].

Following this introduction section, the second section describes the conceptualization of how agile working impacts job-resources and work engagement. The third and fourth sections describe the research method and the results. The short paper concludes with a discussion and conclusions.

## II. THEORETICAL AND EMPIRICAL BACKGROUND

Empirical studies confirm that agile practices can have positive effects on job-resources [16], [17] and stress is perceived more evenly in highly agile teams [18]. In stress research, strengthening factors of work, i.e., social as well as other job-resources, have always played a significant role [19]. It was studied and confirmed, that agile project management and agile software development, reinforced the perception of situational working conditions positively [17].

### A. Job Demands-Resource Model (JD-R)

Effects on performance and efficiency of agile working has dominated empirical research to date and little attention has been paid to health and motivational effects [20]. The JD-R model is a popular and well-evidenced model to explain the effects of work and health. In summary the JD-R model is based on three conditions: (i) situational working conditions can be divided into two categories: job-resources as potential strengthening factors and job-demands as potential weakening factors of work, (ii) work-related strain and well-being are based on two processes: motivational and health impairment process, and (iii) job-resources and job-demands interact with each other. This study focusses on the motivational path of the JD-R model that explains how job-resources lead to work engagement and positive organizational/health outcomes. On top of the motivational path the longitudinal study of Hakanen, Bakker, and Jokisaari also indicates that resources accumulate over the years and have a protective effect against burnout for example [21]. One of these job-resources is social support. Social support is one of the most studied external

health factors [22]. In stress research social support plays an important role [19]. Likewise, within Scrum and the Agile Manifesto, social interaction takes a significant part.

### B. Agile Work – Scrum

Scrum events are an essential part of the operationalization of agile work in the current empirical literature [17], [23]. In empirical studies, two approaches are available that operationalize Scrum in the context of working conditions. "One can place agile development practices into two primary categories (...): agile project management and agile software-development approach" [17]. This study does not set the application context exclusively to software development, as Scrum is emerging in other industries. The broader coverage uses agile project management to measure the extent to which Daily Scrum, Iterative Development, as well as Retrospective and Burndown (an artefact according to the Scrum Guide) are used [17]. The focus is thus on the events of the Scrum Guide. Further, there is ostensibly an understanding in the literature and in commercial measurement tools to examine the maturity of Scrum [24], [25]. In this regard, there is no uniform understanding; moreover, many of the instruments have not been statistically validated and this makes it difficult to compare. The Swiss Agile Study [1] differentiates between hybrid organizations and agile organizations assessed by the study participants. Hybrid organizations apply a mix of agile and non-agile practices [26]. In terms of the application of Scrum events per se, e.g., execution of Daily Scrum, Retrospective and Sprint, agile and hybrid organizations differ little. They do, however, differ in the frequency of the events [1].

### C. Effects of Scrum Events on Motivational Process

Scrum events, especially Sprint Review and Retrospectives institutionalise the possibility to reflect on how the last Sprint went in terms of the increment and of individuals and interactions [27]. Iteration Planning has been confirmed to be positively related to social support in a quantitative study [28]. The quantitative study of Tripp et al. with 124 Scrum professionals confirmed situational working conditions to be amplified and positively perceived in agile project management as well as in agile software development practices [17]. That leads to the assumption that within Scrum the possibility exists to 'lend an ear' to colleagues and to call them in when problems arise [22], this reinforces the social support and with it work engagement. Based on that the following research question will be explored.

**Research Question:** Are social resources in Scrum positively related to work engagement?

## III. METHOD

### A. Design

We conducted an online survey in autumn 2020 for a time period of six weeks with a convenience sample recruited mainly through social network LinkedIn and the Swiss Agile Research Network.

### B. Sample

All members of the sample were using the Scrum events. This was operationalized with the Scrum scale [17]. 132 people completed the survey. There were multivariate outliers, which were analysed using Mahalanobis distance [29]. After considering the content of the data set, it seemed reasonable to exclude them. This resulted in an N=128.

A total of 24.2 % of the participants are female. In terms of age, the largest age group is represented by 40-54 years with 46.9 %, followed by 25-39 years with 33.6 %. 17.2 % were over 55 and 2.3 % were between 15 and 24 years. 77.7 % of the respondents have a tertiary education. The majority of the sample worked full-time (89.1 %) with only 3.1 % between 40 and 60 % work pensum. Three out of four respondents (75.0 %) work in an organisation with more than 1000 employees. The category of organisations with up to 1000 employees includes 19.5 % and organisations up to 100 employees 5.5 % of the respondents. Most respondents report between two and five years of experience with agile practices within the organisation (53.9 %) and themselves (39.8 %). Participants worked in different industrial sectors, such as finance and insurance services (56.3 %), Computer Science and Communication (24.2 %) and others (17.3 %). Due to the recruitment strategy this is not representative for Scrum prevalence within Switzerland.

### C. Measures

The questionnaire consisted of 119 items based on published scales and instruments.

**Scrum Events.** The scale 'extent of agile Project Management practice use' was applied to measure the Scrum Events [17]. This consists of four subscales: Burndown, Retrospective, Daily Stand-ups (according to Scrum Guide 'Daily Scrum') and Iterative Delivery. The Burndown subscale was omitted, as it is not a Scrum event. Retrospective (e.g., *On a regular basis, the team reflects on previous work and looks for ways to improve team performance.*) and Daily Scrum (e.g., *The team has a short meeting every day to discuss what is going on with the project.*) were assessed with three and Iterative Delivery (e.g., *At the beginning of each work cycle, the team and business owners agree on what will be delivered during the work cycle.*) with four items on a seven-point likert scale from *strongly disagree* to *could agree or disagree* to *strongly agree*. The eighth option *don't know* was omitted as the participation criterion for the study included performing these events. The word work cycle was replaced by Sprint based on two feedbacks from the pre-test. The original questionnaire of Tripp et al. intended to capture feedback from non-Agile workers in the sample [17]. This was not the case for this study.

**Social Support.** Social support from work colleagues was assessed with the scale from the Salutogenetic Subjective Analysis of Work (SALSA) instrument [22]. The translated five-point frequency scale was used from *very little/not at all* to *somewhat* to *very much /always*. Social support was measured with three items (e.g., *How much can you rely on your colleagues if problems occur at work?*).

**Work Engagement.** The short scale from the Work and Well-Being Survey (UWES-9) instrument was used to measure work engagement [30]. Work engagement was measured with nine items (e.g., *At my work, I feel bursting with energy.*) on a seven-point frequency scale from *never* to *sometimes* to *always*.

Table 1 reports means, standard deviations, Cronbach's alpha, and intercorrelations.

TABLE I. MEANS (M), STANDARD DEVIATIONS (SD), CORRELATIONS, AND CRONBACH'S ALPHA

Scale	M	SD	1	2	3	4	5
1 Iterative Delivery	6.06	0.79	.53				
2 Daily Scrum	6.06	1.08	.27**	.81			
3 Retrospective	6.03	1.03	<b>.39**</b>	.21*	.87		
4 Social Support	4.21	0.58	.23**	.26**	<b>.38**</b>	.77	
5 Work Engagement	5.13	0.70	.24**	.12	.21*	<b>.34**</b>	.90

N=128. Spearman Correlations after Outlier analysis. \*p < 0.05, \*\*p < 0.01. Correlations higher than 0.30 (p < 0.01) are highlighted in bold. Reliabilities (Cronbach's  $\alpha$ ) are shown on the diagonal. Raw Data incl. Codebook can be made available upon request.

#### D. Data Analysis

Data analysis was conducted using lavaan of R version 3.6.3 [31]. A structural equation analysis, based on data from Scrum practitioners as described in the sample section above, was performed. The theoretically assumed model is shown in Figure 1. The circles represent latent variables. The lines connecting the variables indicate a theoretically hypothesized direct effect. Items of measured variables are described below. The theoretically postulated model examined the association between social support and work engagement in Scrum. Based on the JD-R model, it was assumed for the motivational path that the Scrum events Iterative Planning (latent variable with four items), Daily Scrum (latent variable with three items) and Retrospective (latent variable with three items) increase social support (latent variable with three items) and social support increases work engagement (latent variables with nine items).

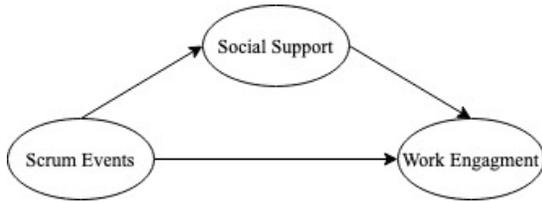


Fig. 1. Theoretically assumed model.

Using confirmatory factor analysis with mlr estimator, as pre-analysis for the assessment of the fit of the factor structure resulted in  $\chi^2 = 331.528$ ,  $df = 199$ ,  $p = 0.000$ ,  $\chi^2/df = 1.666$ ,  $RMSEA = 0.073$  (90% CI [0.059, 0.087]),  $CFI = 0.885$ . One item of Iterative Delivery was removed, due to bad factor loading. The Scrum events were tested as 1-factor-model and 3-factor-model. The 3-factor-model showed a better fit than the 1-factor-model. Goodness-of-fit indices for the 3-factor-model shows  $\chi^2 = 47.914$ ,  $df = 24$ ,  $p = 0.003$ ,  $\chi^2/df = 1.996$ ,  $RMSEA = 0.095$  (90% CI [0.055, 0.134]),  $CFI = 0.933$ . However, based on Table 1 indicating that Daily Scrum does not correlate significantly with work engagement and Iterative Delivery with a questionable Cronbach's alpha, Retrospective was included in the modelling only. Resulting in the following equation:

$$\text{Work Engagement} = \gamma_1 \text{Retrospective} + \gamma_2 \text{Social Support} + \varepsilon_1 \text{ and } \text{Social Support} = \gamma_3 \text{Retrospective} + \varepsilon_2$$

#### IV. RESULTS

Figure 2 illustrates the results of the mediation analyses. First, Retrospective correlated positively with social support. Second, social support was associated positively with work engagement. Third, social support mediated the association between Retrospective and work engagement. Indicators for the model fit are reported in the caption of Figure 2.

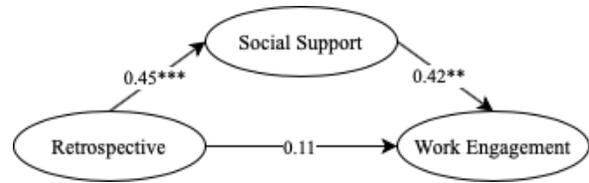


Fig. 2. Social support as a mediator in the association between Retrospective and work engagement. N=128. Direct effect: 0.107 ( $p = 0.400$ ), indirect effect: 0.190 ( $p = 0.004$ ), total effect: 0.298 ( $p = 0.005$ ); fit indices:  $\chi^2 = 148.618$ ,  $df = 87$ ,  $p = 0.000$ ,  $\chi^2/df = 1.708$ ,  $RMSEA = 0.078$  (90% CI [0.056, 0.099]),  $CFI = 0.928$ .

#### V. DISCUSSION

##### A. Strengths and limitations

The chosen design is cross-sectional and no longitudinal and causal effect conclusions can be drawn. Factors of the person as well as job-demands were fully delineated in the present study. The JD-R model was therefore simplified and does not reflect the complexity in practice. The consideration of social support as job-resource only tends not to be a reality as rather many job-resources occur together and can strengthen each other in their effect on work engagement. Iterative delivery indicates that this event is implemented with variability in respective organisations. Each implementation of Scrum has organisational characteristics, which could not be controlled in this study. This study focused on the level of the individual and its perception within a team. We can also reflect on whether certain items of the validated scales should have been minimally reformulated in favour of the compatibility principle. This states that all variables must be measured at the same level [32]. The items of the Scrum events, however, are formulated in team terms compared to the other items, which are formulated in "you" terms. In the sense of weighing up the scales to leave them in their original form vs. adapting them, the introductory sentence was adapted only, but not the wording of the items.

Furthermore, it is recommended for future research to include the specific task of the agile practitioners as a control variable. Experts criticise that agile work is not equally suitable for all tasks [26] and can lead to administrative overhead, which in turn can have an impact on work engagement. Another limitation is the sample selection and size. For stable models in structural equation modelling a larger sample is recommended [33]. To conclude, we cannot rule out the possibility of social desirability with regard to social support and the assessed Scrum items, as Scrum is a very popular framework and answers are generally on a positive side of the scale.

##### B. Implications

The importance of Retrospectives and with it the institutionalisation of feedback is an important outcome of the present study. The Retrospective characteristically stands as an integrated event for reflection on products, ways of working and team situation before the completion of each iteration. However, in practice these feedback loops are repeatedly omitted at the end of an iteration due to time constraints, which can have an impact on the motivation as well as individual and team performance in the medium to long term. To conclude, Scrum events are valuable from a work design perspective, in particular the Retrospective. A comment from the questionnaire sheds some light on the Daily Scrum: "I think what makes me not always on the top of my motivation are when there are a lot of meetings in a single

day. Here there is always a lot to talk about and you sometimes feel out of scope." On the other hand, Retrospectives prove to be significant within the Scrum events, when looking at social support and work engagement. Especially, knowing that Retrospectives are one of those events that are introduced rather late by agile teams [34].

## VI. CONCLUSIONS

In this paper we analysed the effects of Scrum events on social support and work engagement. We conducted an online survey in autumn 2020 for a time period of six weeks. In the study we followed the JD-R model. Iterative Delivery was not included in the analysis due to bad model fit indices and rather low reliability. The prerequisite to include the Daily Scrum in the mediation analysis was not given. The results show that Retrospectives have a positive significant effect on social support and work engagement.

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