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Project overload: An exploratory study of work and management in multi-project settings

Annika Zika-Viktorsson [a,*], Per Sundström [b], Mats Engwall [c]

[a] Department of Machine Design, School of Industrial Engineering and Management, Royal Institute of Technology, 100 44 Stockholm, Sweden
[b] School of Technology and Health, Royal Institute of Technology, 100 44 Stockholm, Sweden
[c] VINNOVA, Swedish Governmental Agency for Innovation Systems, 101 58 Stockholm, Sweden

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Abstract

This study investigates psychosocial aspects of work in multi-project settings and how project members and project managers at operational level perceive their work situation. Work in a multi-project setting entails a complicated situation characterized by tight schedules, multi-tasking, increased coordination expenditures, and a large amount of set-up time when alternating between tasks. The study addresses the issue of *project overload*, a construct that in this study reflects perceived fragmentation, disruption and inefficiency, caused by switching between assignments for separate but simultaneous projects. An explorative approach was adopted for the study, and new models were created and investigated. The primary source of data was a web-based questionnaire. The questionnaire was administered to project co-workers ($n = 392$) in nine companies in Sweden (response rate: 81%). The companies represented manufacturing, pharmaceutical and construction industries, and all occupied a leading position on their respective markets. The results show that almost one-third of the respondents were under perceived project overload, and that 21% ($p \leqslant .001$) of the variance on this variable could be explained by four factors. In order of magnitude, these factors were: (1) lack of opportunities for recuperation, (2) inadequate routines, (3) scarce time resources, and (4) a large number of simultaneous projects. Further, the study indicated that there are associations between high level of project overload and (a) high levels of psychological stress reactions, (b) decreased competence development, and (c) deviations from time schedules.

Keywords: Multi-project; Managing projects; Individuals; Workload

1. Introduction

Characteristic of a multi-project setting is that several projects are being performed at the same time. Projects are pursued in parallel, sharing the same personnel stock and the same management system. This is a way for a company to use human resources in an efficient manner by using scarce resources in many projects. Not only is less idle time secured, but also certain expertise can be shared, and people are able to transfer their knowledge between different projects. The need for planning and control are obvious, since the prerequisites for valid planning and control are impaired; disturbances to one project influence the others, and the situation as a whole is less predictable and possibly less viable. In multi-project settings a major part of the operations is performed and organized as projects, Therefore, they sometimes are referred to as projectified, or project based, organizations [1].

In this paper we present a study that examines the psychosocial aspects of work in multi-project settings. Previous research indicates that sharing time between several projects, at an individual level, may result in perception of work as disrupted and fragmented [1], in elevated levels of time pressure, and in fewer opportunities for recuperation between periods of intense and strenuous work [2].

* Corresponding author. Tel.: +46 8 790 63 03; fax: +46 8 20 22 87.
E-mail address: annika@md.kth.se (A. Zika-Viktorsson).

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Other negative consequences of sharing time between many projects are decreased competence development, and less improvement in work routines [2]. Switching from one project to another can result in considerable amount of set-up time [3]. On the other hand, there are also indications that multi-project settings can provide for increased learning and a rich work content [4,5].

There is a small, but growing, discourse concerning the specific challenges of multi-project management. However, the literature is dominated by the aggregated perspective of project portfolio managers [6] or program management [7], which emphasizes methods for planning and scheduling resources in order to gain control over the portfolio (see, e.g., [8–11]). Such resource-allocation problems include both estimation of the total need of any one project, how needs vary during the project life cycle [12], priorities between different projects, and the number of interfaces between the projects and their surrounding environments [13].

But, the problems related to allocation of human resources are not only a question of administration; they also affect the work situations of individual project members. This article pursues the latter perspective. It inquires into the nature of work in multi-project settings with a special emphasis on psychosocial and organizational factors.

2. Key concepts and propositions

A multi-project setting can be regarded as a network of co-workers being assigned to several simultaneous tasks, which compete for being carried out within a limited time span. Thus, at individual level, project co-workers are engaged in a kind of time-sharing, allocating efforts to the various projects in an attempt to satisfy demands for progress from many, different project managers at the same time. How multi-project work is perceived by project members and project managers at operational level has not so far been thoroughly researched. The current study was performed with the purpose of creating knowledge about such perceptions.

This article addresses how fragmentation, disruption and inefficiency caused by switching between commitments to simultaneous projects are perceived among project members. Referring to previous research on work load [14–17] we call this key construct: *project overload*. Thus, it is hypothesized that project overload stems from working on too many projects, which makes co-workers less able to focus on specific work items in a way that makes them efficient.

The study includes an investigation into how factors related to projects, work organization and psychosocial aspects of work influence project overload. We also looked into the potential relation between project overload and performance, as measured by the extent to which projects followed stipulated schedules at time of investigation [compare 18]. Further, we tested hypotheses about relations between project overload, on the one hand, and stress, competence development and efforts to improve project routines and work methods on the other.

We constructed two models for the study. The first (see Fig. 1) includes nine factors, which address the characteristics of multi-project work that may explain perceived project overload. The second (see Fig. 2) posits relationships between project overload and four different outcome variables. The two sections that follow describe the models in detail.

2.1. Work situation in multi-project settings

The first model (Fig. 1) suggests relations between characteristic factors of a project work situation and perceived project overload among co-workers.

2.1.1. Number of projects

The burden of being involved in one or more projects at the same time varies according to types of projects, and their uniqueness, content, size and scope. For the present study, it was assumed that the more projects a person participates in, the greater is the risk of project overload. Thus, we posed a straightforward question about the number of projects respondents were assigned to, which gives an indication of the number of projects between which they had to switch, and to which they needed to adjust their personal schedules and plans.

2.1.2. Insufficient routines/excessive formalization

Many projectified organizations have initiated formalized processes, which include prescriptions for and direc-

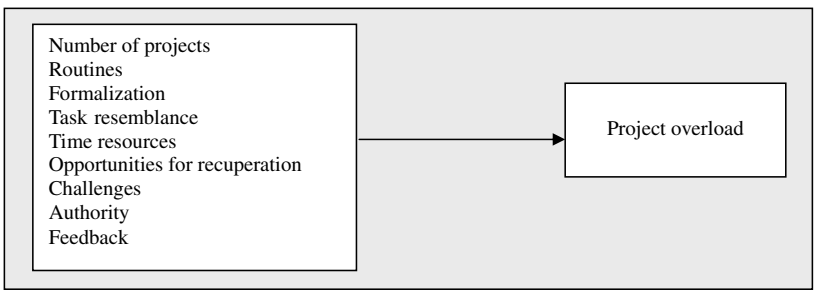

Fig. 1. Proposed model for factors addressing the multi-project work situation that explain project overload.

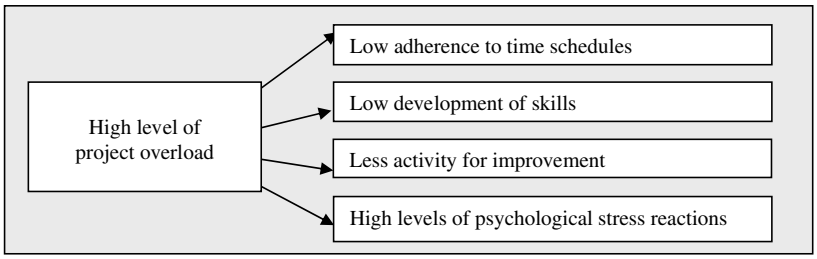

Fig. 2. Proposed model of how project overload may be related to certain outcome variables.

tions to project management. Such processes offer means of support to the project participants, but also enable the multi-project firm to achieve a standardized way of accomplishing projects that is unitary with regard to methods, terminology and philosophy. All projects need established routines to support work and management at operative level, which may facilitate alternation of personnel between projects. Although such routines and prescriptions provide support for operational personnel, they can also be perceived as a burden if project accomplishment becomes too bureaucratic [19]. The balance between too many or too few routines and regulations is a delicate matter in project management. There is a need for common views and standardized methods, but – at the same time – every individual project needs constantly to adapt to the prevailing situation, and it is also essential to maintain levels of motivation, creativity and spontaneity.

2.1.3. Task resemblance

How genuinely unique projects compare with each other affects several parameters, e.g. the possibilities of re-using designs, technical solutions or other results, and of transferring experiences from one project to another. In multi-project settings where the projects are of a rather similar nature, it is easier more directly to use the knowledge generated by one project in another (see, e.g., [20]). This can make project work more effective, and project members less overburdened.

2.1.4. Time resources

The time resources available and the firmness of deadlines are highly relevant to how co-workers behave and perceive their situation [21–23]. Time focus, schedules and time limits are important in almost all kinds of projects, and time pressure is an important driving force for work progress. Even if every project does not give rise to stress, time pressure was found to be regarded as ubiquitous in project work in this study. Further, in the highly projectified companies of the kind investigated in the study, time issues emerged as even more relevant, since the schedules of different projects are partly dependent on each other.

2.1.5. Opportunities for recuperation

Where there is a tendency to push as many projects as possible into a portfolio, the pressure on project members and project managers is constantly high. There is a risk that the opportunity to "catch breath" and reflect over the situation after a peak in effort is reduced in project-intensive work settings [24]. From a health perspective, it is of importance to have enough time to recuperate between projects or intensive periods of work. Time pressure in general must not be intrinsically regarded as detrimental to health. However, previous research in areas other than project work has shown that there is a relationship between tenure, on the one hand, and high level of time pressure and health problems, on the other [25,26].

2.1.6. Challenges

Having a challenging project goal and stimulating dimensions to work tasks is relevant to how project work evolves. A project goal that stimulates and challenges project members and managers encourages motivation and personal development [27,28]. A challenging goal is a strong motivator, and may also be a source of unity among project members. In this study, it was expected that a challenging project goal would influence project overload by making it easier to work and thereby reduce any negative perceptions of a project.

2.1.7. Authority

Previous research has shown that perceived responsibility, at an individual level, has to be counterbalanced by sanctioned authority [29]. Having adequate authority can improve possibilities of gaining control in stressful and overloaded situations, thereby influencing the work situation through relevant decisions. However, having adequate authority and the opportunity to take appropriate decisions when required may be important for others than project managers. There is also a need to empower co-workers, so that they are able to adapt quickly to upcoming situations, with the aim of goal achievement.

2.1.8. Feedback

Research has also shown that personal feedback has a strong positive effect on employee satisfaction [27]. In projects, feedback is usually a built-in component (at collective level), because of constant evaluation in relation to schedules, budgets, and quality measures. This can be stimulating in its own right, but may also reinforce perceived control in a multi-project work situation

characterized by complexity and difficulties in maintaining an overview.

2.2. Consequences of project overload

As shown in Fig. 2, it was suggested for this study that project overload is related to a number of outcome variables. We proposed that project overload has negative effects on performance and the development of professional skills, and may also induce psychological stress reactions. We also suggested that it may be associated with the hindering of improvement efforts by project members. Here, these outcome variables are seen as important aspects of project work, on top of the fulfillment of project goals; they also concern personal development and well-being.

Plans and schedules are of considerable importance in industrial project work [2]. This is not only because time is in focus but also because different activities have to be coordinated. In research as well as in practice, adherence to plans is a common way of judging project performance [30]. Generally speaking, the extent to which adherence to time schedule reflects performance may be questioned; not being in line with a timetable may equally well indicate poor planning, diffuse milestones, changes in the surrounding organization, or disturbances from other projects. However, since frequent switching between different tasks often creates a lack of focus and inefficiencies due to set-up time, it seems plausible that a high level of project overload will produce delays in relation to pre-set schedules. We used this rather blunt measure because it has something to say about performance.

Professional competence and skills are constantly developed and shaped in daily work [31,32]. Although it is an obvious necessity in many companies to keep up with changing demands for competence, previous research has shown that opportunities for competence development can be impaired in a multi-project setting [2]. In such settings, there is an obvious risk that time for long-term development and training is not sufficiently prioritized in relation to short-term project delivery. At the same time, it may be difficult to obtain time to reflect over and analyze daily work in a manner that generates new insights, knowledge and professional skills. Advanced reflections are not only important in order to achieve optimal solutions to technical problems, but are also essential to learning from experience and to the possibility of thinking in new and innovative ways (see [33]). They are also a necessity for continuous, long-term improvements in applied work procedures and tools.

An important aspect of a healthy work situation is an appropriate level of strain. Psychological stress reactions, here defined as sleeping problems, fatigue and inability to let go of problems when leaving the job for the day [34], form a multidimensional construct that can roughly be described as a reaction of an imbalance between demands and control. A majority of stress theories define stress as a reaction to a perceived discrepancy between an individual's available resources and demands [e.g.,[25,35,36]]. Perceiving control *in* work is important for reducing negative stress [25]. In multi-project settings experienced control over one's own work is at risk of being reduced not only by conflicting demands from different projects, but also by difficulties in obtaining an overview of the situation and fairly complicated planning. In such settings there is a great need for plans and overviews, but it is harder to obtain an adequate level of predictability and the opportunity to plan. Consequently, we presumed that psychological stress reactions are a consequence of too much fragmentation and ''scatteredness'', i.e. project overload.

2.3. Aim of the study, research questions and hypotheses

The general aim of the study was to investigate the work situation of project members and project managers in multi-project settings, focusing on both psychosocial aspects and factors related to the organizing of project work. Thus, *the question that guided the research* was as follows: What organizational and psychosocial variables explain perceived project overload in multi-project settings?

Four *hypotheses* were formulated: (H1) There is a negative relationship between project overload and adherence to time schedules; (H2) There is a negative relationship between project overload and development of professional skills; (H3) There is a negative relationship between project overload and participation in work for improvement of routines and methods; (H4) There is a positive relationship between project overload and psychological stress reactions.

3. Methods

3.1. Empirical setting

People from nine companies in Sweden participated in the study. The companies were all well established, had more than 500 employees, held front-line positions on their respective markets, and were in a favorable financial situation.

The companies represented the mechanical, the pharmaceutical and the construction industries. However, all respondents belonged to highly projectified parts of the companies, e.g. divisions for product development or R&D. Thus, the respondents belonged to organizations (divisions, departments, subsidiaries) with well established procedures for project management and an institutionalized group of professional project manager. But, they also had a rather complex multi-project environment.

3.2. Respondents

The total number of respondents was 392, comprising both project managers and project members. On average,

they participated in approximately three projects simultaneously (see Appendix A). Even if 23% of the respondents reported participation in only one project they were active in projects that were executed in multi-project settings. Consequently, they were representatives of the kind of work environment in focus of the study.

On average, the respondents had been active in their professions for 18 years, and had been employed at their companies for 11 years. Their average age was 42 years, and 75% of them were men.

Approximately half of the study group (53%) reported that, during the time of the study, they held project-management responsibilities; that is, they were managing a whole project or were responsible for a part of a larger project (a sub-project). Almost all respondents reported that they worked full-time. On average, they worked 42 h per week, and their working time was primarily devoted to projects (76% for project managers, and 66% for project members).

The respondents were generally assigned to cross-functional projects, in some cases also sharing resources various different international locations. The peak number of co-workers involved in the projects ranged from 8 to 80 co-workers. The average project had a duration of 2 years, varying between 1.5 and 10 years.

A majority of respondents participated in R&D projects (70%); the second largest group of projects (according to number of respondents) concerned construction and contracts (28%), the third IT (8%), and the fourth production improvements (7%). Since 46% of the respondents took part in two or more types, the overall figure exceeds 100%.

3.3. Procedures

The primary source of data was a web-based questionnaire (response rate: 81%). The questions concerning challenging goals, deficient authority, and development of professional skills were taken from Zika-Viktorsson, Hovmark & Nordqvist [35]. The items about personal feedback and psychological stress reactions were taken from Hovmark & Thomson [34], although slightly modified for this study. The other questions were specifically constructed for the study.

The questionnaire contained items covering the multi-project setting and psychosocial aspects of the work situation. All responses to statements were given on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). In addition, there were questions concerning team members' personal backgrounds and their current projects.

Factor analysis was used for data reduction. All factor loadings had magnitudes larger than 0.58. Reliability was estimated by Cronbach's alpha (see Appendix A). All variables were approximately normally distributed.

Bivariate correlations (Pearson coefficients), with a two-tailed significance test, and multiple hierarchical regressions were used in the analyses.

3.4. Measures

The following variables were investigated:

Number of projects (1 item); Insufficient project routines (3 items, e.g. "I lack routines and procedures for the accomplishment of my projects"); Excessive formalization (3 items, e.g. "Existing routines for project management are too bureaucratic"); *Task resemblance* (4 items, e.g. "My projects have great similarities with regard to applied work methods"); Insufficient time resources (3 items, e.g. "The work in my projects is often characterized by lack of time"); Opportunities for recuperation (3 items, e.g. "It is possible for me to recuperate between peaks of work"); Challenging project goals (3 items, e.g. "The goals of my projects are very demanding"); Deficient authority (3 items, e.g. "My work in the projects is often hindered because I don't have the right authority"); Personal feedback (3 items, e.g. "I often get constructive opinions on my work in the projects"); Project overload (3 items, e.g. "Because of constant switching between projects I cant get enough work done"); Adherence to time schedules (1 item); Development of professional skills (3 items, e.g. "My work in the projects enables me to develop my skills"); *Improvement efforts* (2 items, e.g. "I take an active part in the improvement of work routines"); Stress reactions (4 items, concerning, psychological fatigue, sleep disturbances, etc.).

Four background variables were included: age, sex, project role, and time in project work. Project role indicates whether or not the respondent had formal responsibilities for managing a whole project or a subproject. Time in project work reflects how much time at work was spent on projects rather than within the permanent organization.

4. Results

Descriptive statistics and inter-correlations between the study variables are shown in Appendix A.

Project overload is the variable in main focus. Regarding its prevalence, 30.9% of the study group agreed with the statements that indicated project overload.

A regression analysis shows that four variables – lack of opportunities for recuperation, insufficient routines, insufficient time resources, and number of projects – explain 21% ($p \leqslant .001$) of the variance in project overload (see Table 1). Among those variables, lack of opportunities for recuperation has the greatest influence. The other variables (deficient authority, project resemblance, excessive formalization, challenging project goals, and personal feedback) were also tested, but failed to reach statistical significance.

Further, the influence of background variables was tested (see Table 1). The results show that, at a first step, when only background variables were entered into the model, sex had a significant association with project

Table 1
Summary of results of hierarchical regression analysis for the dependent variable, *project overload* ($N = 392$)

Dependent variable: project overload	Beta	
Variables entered	1	2
Step 1		
Age	−.05	−.02
Sex[a]	.14**	.07
Project role[b]	−.08	−.04
Project time[c]	−.07	−.02
Step 2		
Opportunities for recuperation		−.23***
Insufficient project routines		−.16***
Insufficient time resources		−.17***
Number of projects		−.14**
Deficient authority		−.09
Challenging project goals		−.08
Excessive formalization		−.06
Personal feedback		−.03
Task resemblance		−.02
R^2	−.03**	−.24***
ΔR^2	−.03	−.21***

R^2 = explained variance; ΔR^2 = additional contribution to explained variance.
[a] Women = 1, Men = 2.
[b] Project-management responsibilities were measured on a two-point scale: 1 = no formal responsibilities for managing projects, 2 = formal responsibilities for managing a full project or subproject.
[c] Proportion of working time devoted to projects.
** $p \leqslant 0.01$.
*** $p \leqslant 0.001$.

overload. That is, men tended to report higher levels of project overload. However, at the next step, there was no such significant association; age, sex, project-management responsibilities portion of work time spent on projects made no contribution to the explained variation in overload.

Project overload was significantly and negatively correlated with the proportion of projects that adhered to their time schedule ($r = -0.23$) (see Appendix A). That is, a high level of project overload is accompanied by a decreased number of projects that are in line with their stipulated schedules. Thus, Hypothesis 1, proposing a negative relationship between project overload and adherence to time schedule, was partly supported by the results. But, it is important to consider that the direction of causation is not established; delays and deviations from schedules may be a consequence of project overload, but project overload may as well be a consequence of problems with meeting pre-set schedules and deadlines.

Hypothesis 2 was that there is a negative relationship between project overload and self-reported development of competence and professional skills. The results (see Appendix A) support the hypothesis. In other words, co-workers who report low levels of project overload also report high levels of competence development ($r = -0.11$).

Hypothesis 3 was not supported. The results show no significant relationship between project overload and efforts to improve routines and work methods.

Hypothesis 4 was that there is a positive relationship between project overload and psychological-stress reactions. The results, shown in the Appendix A, support the hypothesis. The Table reports that high levels of project overload are associated with high levels of psychological stress reactions ($r = 0.28$).

5. Discussion

In the study we introduced a construct that reflects overload specifically related to project work and multi-project settings. As we have argued, such a construct is needed to reflect a situation in which fragmentation, disturbances and interruptions are highly relevant dimensions of workload. The construct reflects the extent to which project co-workers experienced individual inefficiency due to fragmentation, and lost focus because of alternating between projects. It also reflects whether their own work is disrupted by problems in accompanying projects.

Multi-project work is somewhat different from other kinds of multi-tasking. Being a multi-project worker (in the sense of this study) is to be formally assigned to a temporary organization with a demand to coordinate one's own work with that of other members of a project or projects. The person in question may have autonomy with regard to technical solutions, but is still governed by what happens (or not) in surrounding projects.

The findings suggest that perceived project overload may partly be explained by commitment to too many projects at the same time, and few opportunities to recuperate between project assignments, in combination with inadequate work procedures and high time pressure in the organization. Among these four significant factors, lack of recuperation opportunities is the single most potent predictor of project overload. Further, the study suggests that project overload is associated with impaired performance (measured as lack of adherence to schedule), high levels of psychological stress reactions, and decreased individual competence development.

5.1. Factors explaining project overload

Previous studies with a focus on project settings and workload indicate that project work enhances the risk of excessive workload, partly due to parallel activities that demand much prioritizing [36] and partly as a consequence of being divided between different project roles. Further, roles concerned with projects may clash with those within the permanent organization [37]. Our results show that lack of opportunities for recuperation is the strongest predictor of project overload among the tested ones. This factor is to be expected when the total workload of the organization reduces the chance of recuperating between intense work periods. This aligns well with theories on workload and

stress emphasizing the importance, not only of time for rests, but also opportunities for reflection and gaining an overview of working conditions [26,38]. If there is persistent high pressure, important opportunities for gaining control and reflecting over the actual and upcoming situation are missed.

The results show furthermore, that insufficient time resources within projects make up a factor that explains project overload. Excessive time pressure may reduce chances of coping with fragmentation and disturbance, both practically and mentally. Time pressure is not intrinsically negative, but extensive periods of a high level of time pressure are damaging to health [25]. Previous research on industrial projects has shown that the negative effects of time pressure on job satisfaction and performance can be moderated by a project team's collective belief in its own capacity and its collective support for the project goal [39,40].

Insufficient routines constitute the third variable that explains project overload. From the study it is not clear whether routines really were insufficient or whether respondents were simply reporting a wish for greater orderliness. Adequate routines are of practical help in daily work, and a means of gaining control in project work, which in turn lowers the risk of too high a level of negative stress. Plans and processes are ways of controlling and structuring, which reduces insecurity.

Finally, the number of simultaneous projects an individual is engaged in predicts project overload. Although the contribution from this single factor may be seen as surprisingly weak considering the multi-project approach, the result still shows that this is one of four important factors explaining experienced project overload. However, this study aligns well with earlier research on perceptions of work load; factors of a more general character than the number of simultaneous projects, actually have a stronger impact on perceptions of workload – also in a multi project setting.

5.2. Outcomes of project overload

The study also indicates that project overload is associated with impaired performance (measured in terms of poor adherence to time schedules), high levels of psychological stress reactions, and decreased competence development.

The results show a relationship between adherence to schedule and project overload. How this is to be explained raises questions of both causation and validity. Even if project overload has negative consequences for opportunities to accord with plans and fulfill time goals, missed time goals may still generate perceptions of project overload. Concerning the relevance of the measure, it is important to consider the extent to which adherence to time schedule reflects performance in terms of efficiency at work or whether it actually measures performance in planning and scheduling. Although this can be questioned, adherence to time plan is, in many practical project situations, an important dimension when checking the status of a project, which gives some merit to this kind of measure.

The finding of a negative relationship between project overload and development of professional skills is in line with previous findings [24]. In work-life it is important for people to be able to learn and develop, and this is also, according to Hackman [41], an important aspect of long-term efficiency. For this study, it was assumed that the multi-project situation risks offering too little time and space for activities that make people grow, in the forms of reflection, interaction and searching for new knowledge.

The results also suggest that project overload is related to psychological stress reactions and self-reported development of professional skills. Although no conclusion concerning causality can be drawn, the findings indicate that project overload may have negative impacts on both well-being and personal development. It is quite reasonable to assume that extensive project overload, i.e. high levels of fragmentation and disturbances, results in stress reactions as well as less time for personal development.

5.3. Limitations and future research

This study is an explorative attempt to test variables created for measuring the work situation in highly projectified organizations. Although there are some limitations this study addresses important aspects of this kind of complex and intense work environment. In addition, it contributes to a conceptual platform for further inquiries into the human aspects of multi-project management.

Two limitations need to be comment on more specifically. Firstly, among the variables that significantly explained variance in project overload, the number of projects made the smallest contribution. There are some limitations concerning the validity of the variable. It is impossible to determine the extent to which the projects reported are comparable with each other and how tasks named projects in one company should be compared with sub-projects in another. The kind of tasks or jobs that were defined as projects vary from case to case and from company to company. Consequently, consistency on this measure may be low. However, because of the large number of respondents, and also due to important similarities between the companies involved with regard to project management and related terminology, the measure does have relevance. It has to be regarded as roughly indicating involvement in a few or many projects concurrently.

Secondly, even though we have drawn some preliminary conclusions concerning the directions of the relationships, the results of correlation studies per se do not reveal which variable affects the other. Although they may well be in the directions we suggest, it is important to consider the possibilities that low adherence to time plan and less development of skills produce the feelings

of project overload. One often-assumed relational direction is that experiences of environmental factors give rise to attitudinal and behavioral reactions in the individual [42]. However, it can, at least in many cases, be that the respondent's attitudes affect his or her experiences of the work environment.

For future research the research design needs further improvements in order to gain an in-depth understanding of work conditions in multi-project settings. For example we need more sophisticated and tailored performance measures but also a research approach that make it possible to better control differences between work performed in projects and other tasks. In addition, the current study requires replication in other types of businesses and organizational contexts. Furthermore, there is a need for supplementing the current quantitative methods with contributions from qualitative studies. Finally, data from this study have to be subjected to more advanced analyses in order to investigate the extent to which project overload is an intermediate variable between the predictors and the outcome variables. Thus, there is a strong need for applied research searching for applicable solutions to social-psychological problems emanating from multi-project organizing.

5.4. Implications

Multi-project settings constitute a dynamic and challenging work environment at the same time as it has some interesting built-in problems due to the complexity of such a context. By increasing linkage between projects, by integrating parts and by increasing interdependencies, the organization becomes less predictable. Previous research into multi-project management has pointed to problems concerning resource allocation. These studies suggest that there are different ways of gaining control and reducing the risk that human resources are inefficiently used in project businesses [8,10,11]. Although such planning systems may be of great benefit, they should not be presented as panaceas. Many of the systems depend on the idea that projects and people are highly able to plan and obedient.

It can be concluded from this study that project co-workers who participate in parallel projects, acting in a setting characterized by scarce time resources, few opportunities and inadequate routines, run the risk of becoming overburdened. It is essential, within a multi-project firm, to be aware of consequences at individual level when there is an imbalance between human resources and business demands. To put projects and co-workers under excessive pressure not only jeopardizes their well-being, but also jeopardizes quality in work and long-term development. Accordingly, as well as it being essential to achieve balance between project demands and human resources, there is a need for adequate routines and support processes when pressure is high, and also for possibilities to vary intensity in the workplace.

Appendix A

Descriptive statistics and correlation matrix for study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Age	−.1″																	
2. Sex (1 = w; 2 = m)	−.12*	−.1																
3. Project role (1 = no pm-responsibilities; 2 = formal pm-responsibilities)	−.07	−.03	−.1															
4. Time in project work (%)	−.10*	−.04	−.18*	−.1														
5. Number of projects	−.12*	−.10*	−.02	−.00	−.1													
6. Insufficient project routines (α = .58)	−.09″	−.12*	−.04	−.08	−.02	−.1												

7. Excessive formalization ($\alpha = .75$)	−.14*	−.06	−.12*	−.04	−.02	−.00	−.1											
8. Task resemblance ($\alpha = .63$)	−.02″	−.00	−.05	−.05	−.07″	−.03″	−.09″	−.1										
9. Insufficient time-resources ($\alpha = .63$)	−.03″	−.05	−.02	−.03	−.05″	−.22*	−.05″	−.00″	−.1									
10. Recuperation opportunities ($\alpha = .80$)	−.08″	−.03	−.01	−.05	−.12*	−.10*	−.04	−.05″	−.32*	−.1								
11. Challenging project goals ($\alpha = .60$)	−.01″	−.03	−.08	−.16*	−.03	−.16*	−.13*	−.11*	−.08	−.07	−.1							
12. Deficient authority ($\alpha = .81$)	−.04″	−.12*	−.21*	−.01	−.01	−.27*	−.29*	−.08	−.12*	−.11*	−.15*	−.1						
13. Personal feedback ($\alpha = .73$)	−.10*	−.05	−.08	−.04	−.04	−.20*	−.04	−.04	−.22*	−.13*	−.30*	−.22*	−.1					
14. Project overload ($\alpha = .61$)	−.02″	−.13*	−.07	−.05	−.18*	−.26*	−.12*	−.04	−.31*	−.32*	−.11*	−.22*	−.11*	−.1				
15. Development of professional skills ($\alpha = .65$)	−.01″	−.13*	−.11*	−.15*	−.00	−.08	−.11*	−.03	−.09	−.04	−.53*	−.15*	−.20*	−.11*	−.1			
16. Improvement efforts ($\alpha = .74$)	−.05	−.16*	−.03	−.01	−.00	−.08	−.00	−.05	−.07	−.05	−.06	−.04	−.03	−.07	−.10	−.1		
17. Psychological stress reactions ($\alpha = .76$)	−.00″	−.14*	−.04	−.09	−.04	−.09	−.02	−.07	−.29*	−.54*	−.05	−.09	−.11*	−.28*	−.04	−.03	−.1	
18. Adherence to time-schedules (%)	−.01	−.17*	−.12*	−.00	−.18*	−.21*	−.00	−.03	−.29*	−.08	−.09	−.06	−.08	−.23*	−.09	−.08	−.05	−.1
Mean	41.57″	1.76	1.53	71.9	3.13″	2.73″	2.49″	3.18″	3.44″	2.69″	3.64″	2.38″	2.73″	2.75″	3.72″	2.52	2.72″	60.0
SD	9.81″	0.43	0.50	26.8	2.22″	0.81″	0.86″	0.74″	0.71″	0.88″	0.69″	0.89″	0.76″	0.85″	0.69″	1.07	0.68″	38.0

* $p < .05$.

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