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Doctoral students' well-being – an imperative on the path to accomplishment

Colette Niclasse-Haenggi*

Abstract

A doctoral journey is an emotional rollercoaster alternating elation, contentment, relief, hope, interest, with stress, anxiety and frustration. Students who embark on this adventure enrich themselves personally and professionally. However, they are also more likely than others to give up or develop mental health problems. The aim of our longitudinal mixed-method research is to investigate significant emotional events experienced by doctoral students from a medium-sized Swiss university, and to understand what affects their well-being, and since well-being is a decisive factor of accomplishment, to identify which needs must be met to ensure it. 191 events were content analyzed according to the Self-Determination Theory (Deci & Ryan, 2000). We considered three basic psychological needs and the way they were supported or constrained by environment. Standing out, and in line with previous findings, were the feeling of progression and mastery (competence), the importance of a trusted proximal network (relatedness), and the possibility to act with volition and self-endorsement (autonomy). Recommendations for people interacting with or supervising doctoral students are suggested.

1. Introduction

In recent years, the health of doctoral students has emerged as a significant issue in Europe and around the world. The findings give cause for concern: approximately 40–50% of doctoral students experience psychological distress and 30–40% may develop psychological disorders such as depression (Evans, Bira, Gastelum, Weiss, & Vanderford, 2018; Levecque, Anseel, De Beuckelaer, Van der Heyden, & Gisle, 2017). However, as stated by the World Health Organization, health is “a state of complete physical, mental and social well-being and not merely the absence of disease”. This issue adds to the older and

still thorny matter of dropouts, between 30% and 60% depending on the field of study (Bourdages, 2001; McAlpine & Norton, 2006).

Studies on doctoral students' health and well-being are recent and scarce. Interesting (mostly negative) affective aspects of their journey (steady presence of risky emotions like stress and anxiety, emotional rollercoaster, etc.) emerge but quite often merely as adjunct results.

By contrast, the question of doctoral completion has already given rise to a great deal of predictive and descriptive research focusing on factors differentiating completers from quitters, mostly in retrospective approaches. The results are rather contradictory regarding individual and sociodemographic variables (e.g. motivation, gender, age, financial resources, school path, etc.) and contextual variables (e.g. institutional demands, supervision modes, programs, etc.). Reasons for dropouts are multiple, interconnected and complex. The findings reveal a broad dissatisfaction rather than a particular or predominant cause (Bourdages, 2001). A crucial point seems to be the representations the students construct throughout their doctoral journey, which will arouse dynamics of (dis)engagement (Frenay & Romainville, 2013).

In an extensive review, McAlpine, Paulson, Gonçalves, and Jazvac-Martek (2012) emphasize that the students themselves are often seen as the source of the difficulties rather than the academic context. They synthesize interesting results of contrasting research that show for example that supervisors have difficulty giving examples of personal issues students might experience, but mention observing cues related to student's work, that when difficulties arise students tend to ascribe them to personal issues (but are reluctant to talk about it for fear of not matching up), and that the proximal network is critical as a source of support or constraint.

Only few researches provide a sound and comprehensive theoretical frame to investigate those occurrences together and in their complexity (Devos et al., 2016; Van der Linden et al., 2018). The Self-Determination Theory (Deci & Ryan, 2000) is a promising integrative way of doing it. This broad framework is a powerful means to understanding the conditions enhancing or undermining human capacities for psychological growth,

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well-being, and engagement. This theory focuses on how social-contextual factors support an individual's thriving through the satisfaction of three basic psychological needs: autonomy (e.g. self-regulation, volition, self-endorsement), competence (e.g. mastery and effectance in one's interactions with the social environment), and relatedness (e.g. feeling connected and involved, sense of belonging, Ryan & Deci, 2017).

The support provided by the social context, including the supervisor, can nurture elements that help satisfy those needs, namely autonomy support (e.g. offering opportunities to choose directions, encouraging initiative and reflection, linking activities to values, goals and needs), structure (e.g. informational constructive feedback, in-depth discussions, offer expertise, devoting time), and involvement (e.g. concern and interest for the person, availability, reassurance). Some practices, in contrast, thwart the needs: control (e.g. time pressure, overt or covert control over directions or daily activities), chaos (e.g. lack of or negative feedback, contradictory demands, unreachable goals), and rejection (e.g. neglect, remoteness, hostile behaviors) (Devos et al., 2015; Van der Linden et al., 2018). More than 30 years of laboratory and field research, especially in the educational area, evidence the effects of need satisfaction and support (and their thwarting counterparts) on psychological integrity and well-being, the way it affects motivation, interest, creativity, learning (incl. internalization of social norms and practices), persistence, and performance (Ryan & Deci, 2017), all of them being decisive elements of doctoral students' journey and their work as researchers afterwards.

European projects and their follow-ups such as "Research on PhD (RoPe)" in Belgium (e.g. Devos et al., 2016; Van der Linden et al., 2018) and national research project on PhD education in Finland (e.g. Vekkila, Pyhältö, & Lonka, 2013), as well as studies in the field of health (e.g. Weinstein & Ryan, 2011), show that competence, namely perceiving oneself as knowledgeable and skilled, as moving forward and progressing, as meeting challenges successfully, is a decisive key for persistence and well-being (e.g. experiencing less stress). Autonomy and its support tend to stand out more prominently when thwarted as when satisfied in students' narratives, but not in quantitative studies. Being subject to controlling practices can lead individuals to experience high levels of frustration and anxiety. Anxiety is particularly triggered by contexts featuring competition, comparison, and evaluative practices (which are ubiquitous in academic settings). Experiences of relatedness and involvement are a salient element of narratives, largely concerning the supervisor. Practices of structure also emerge nota-

bly, often together with involvement. Finally, Van der Linden et al. (2018) demonstrate that the effects of need satisfaction and support on engagement appear mainly through the emotional dimension. This is in line with the Belgian and Finnish results, showing that emotional equanimity (e.g. not too much distress and less intense unpleasant emotions) implies more perseverance and/or engagement.

This is enlightening if we consider the functionality of emotions: a social system of signaling, allowing flexibility of behavior (Sander & Scherer, 2009b). Emotions are signs that something important is happening in relation e.g. to the needs, motives, values and beliefs of the individual, and that the event may require adaptative action or internal adjustment (Scherer, 2001). Emotions are also indicators of subjective well-being (Sander & Scherer, 2009a). They are thus a meaningful source of information and should therefore be fully considered.

To summarize, emotions are an inherent part of the doctoral journeys. They show how students, in interaction with their environment, are challenged, affected in their values, needs, motivations, and perception of themselves. Students are more engaged, persistent and healthy when their needs are satisfied and when they perceive their supervisor as interested and encouraging. The need of competence and its support stand out. The results are less clear for autonomy, which emerges transiently, and for relatedness, since the personal network can be source of both support and constrain.

The aim of our longitudinal mixed-method research is to investigate significant emotional events experienced by doctoral students from a medium-sized Swiss university, and to understand what affects their well-being, and since well-being is a decisive factor of accomplishment, to identify which needs must be met to ensure it.

2. Research context and methodology

The University of Fribourg hosts about 1200 doctoral students a year. Each department rules the framework and requirements for its doctorate. The Swiss federal statistical office estimates the graduation rate in the years 2005–2009 from 90% for exact and natural sciences, to 54% for economical sciences, at 69% for Social Sciences and Humanities (SHS).

26 doctoral students participated in this longitudinal mixed method study: 21 women and 5 men, age between 25 and 59 ($m=32$). 58% work as assistants, 39% take part in a funded research project, 3% work in the private sector. All fields of study are repre-

sented except Medicine and Pharmacy; 69% study SHS. 66% are in the stage of data collection and analysis, 19% work on the project, and 15% are finalizing their research and thesis. During the research, one student dropped out of doctoral studies.

The participants were asked to report significant emotional events on the spot, during 3 weeks between October 2016 and January 2017. With an adapted version of the Geneva Appraisal Questionnaire (GAQ, Scherer, 2001), they described for each event their subjective feeling, i.e. the verbal description of the emotion(s) as experienced (conscious aspect of the emotional process). They also sketched and evaluated the triggering event, its personal and situational antecedents, and its consequences.

The qualitative data of the 256 reported events were content coded in a mixed categories approach (L'Écuyer, 1990) starting from the Geneva Affect Label Coder (GALC, Scherer, 2005) and the Doctorate-related Need Support and Need Satisfaction short scales (D-N2S; Van der Linden et al., 2018). The analyses were intersubjectively validated with each participant in a follow-up interview, to ensure that the meaning they gave in their narration had been preserved. The final sample encompasses 191 events (75%) that, according to the students, affected their doctoral process and subjective well-being in an impeding or facilitating way. Events of neutral impact or with missing answers were dismissed (25%).

Globally, students either experience facilitating events that satisfy their needs of competence, relatedness and autonomy, which leads to more vitality; or they are confronted with impeding events that thwart these needs, which lessens their well-being. The next section reports the facilitating and the impeding events, the most experienced emotions, and how needs were affected. The findings are illustrated with a few narratives (translated by us from French to English, and slightly synthesized). Participants' names were changed, and some details removed to ensure anonymity.

3. Facilitating events

93 (49%) of the 191 analyzed events affected the doctoral process and the student's subjective well-being in a beneficial way. The most frequent emotions¹ resulting from those events were contentment (53%), relief (36%) and hope (24%). They arose separately or jointly (emotional blends). 40% of the 93 events triggered concomitantly unpleasant emotions (mixed emotional patterns), mostly anxiety and fear (related

to social interaction), however without compromising the well-being.

3.1. Need satisfaction

The three basic needs – competence, relatedness and autonomy – were satisfied, when students felt mastering and effectance, got adequate support, and saw their commitment acknowledged.

3.1.1. Competence satisfaction (67 out of 93 facilitating events | 72%). The students perceived a sense of progress (e.g., find new elements, complete data or analysis, get results, make headway in the writing) and/or accomplishment (e.g. achieve a goal, overcome a challenge). They also described the feeling of mastering the task or learning something useful. 22% of the events triggered interest.

"I submitted the third article of my thesis. It was a real challenge because I wrote it in English, hence a certain satisfaction. I am now waiting for the feedbacks of the reviewers, which worries me. A major step forward in my cumulative thesis process, even if the acceptance of the article will be even more essential." (Eric, SHS)

3.1.2. Relatedness satisfaction (22 events out of 93 | 24%). The students felt integrated in their proximal teams and interacted warmly on a collaborative and mutual supportive basis (e.g. feeling of belonging and mattering, care taking if things get rough). They also valued the exchanges with distal actors like participants to their research and supervised undergraduate students (e.g. warm interactions, perception of implication and gratefulness).

3.1.3. Autonomy satisfaction (21 events out of 93 | 23%). Students felt volition and experienced self-regulation (e.g. find a balanced organization of activities, dedicate time to work on their research or for recovery) and were globally satisfied with their time management. Other times, they felt a regain of self-endorsement (e.g. meaning of doctoral studies, balanced priorities in life). 71% of those events satisfied the competence need concomitantly.

"I have decided to change something in my work strategy: I work in the morning on what requires the most energy and concentration and leave for the afternoon "lighter" or less intellectual things. Especially, I do not work on the interviews transcripts in the morning [...]. Today, I tested this new way and it works, which motivates me." (Romain, SHS)

3.2. Supportive environment

For 36 out of the 93 facilitating events (39%), students mentioned environmental support – structure

¹ For extensive definitions see Sander and Scherer (2009a).

and implication practices very often, autonomy support infrequently.

3.2.1. Structure (25 events out of 36 | 69%). Students described forms of guidance such as constructive and informative feedbacks, joint exploration of ways to address difficulties. Providers were mostly their supervisors, then close peers, and to a lesser extent the scientific community or members of their teams. In 25% of the events, the supervisor evoked their confidence in student's success. Scaffolding rarely emerged.

3.2.2. Implication (16 events out of 36 | 44%). The students felt that they, and their research matter (e.g. interest, warmth). They felt secure to discuss their standpoint, and confident. Providers were mostly supervisors, to a lesser extent peers and teams. 75% of these practices also involved structure.

Two events illustrate the importance of proximal network resources and emphasize the possible ambivalence of social interactions, and the experienced rollercoaster between and within events.

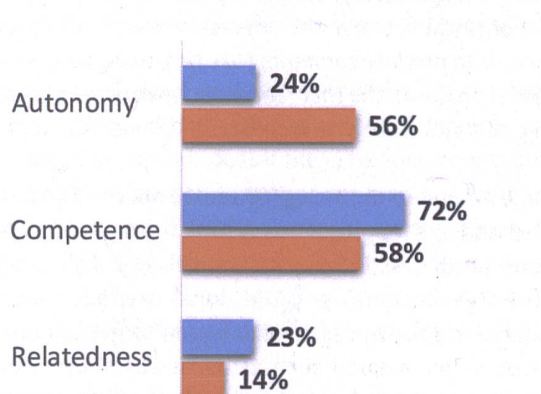
"I had an appointment with my supervisor this morning. I had sent him beforehand parts of my thesis to read and I had specific questions regarding these parts and other points. I dreaded this appointment because previous exchanges were superficial since he hadn't read the documents I had submitted and shortened due to time pressure. Today, I got pragmatic feedback. I feel confident to continue writing my thesis. I know where I am going, and I feel like I will succeed." (Daphné, SHS)

"I asked a few people to critically assess a questionnaire I had prepared for my research. I don't like asking people because I know that everyone has a lot to do. So, I hesitated to contact them. After receiving a positive answer, I feel content and encouraged to continue. I'm waiting for the others to respond. If all agree, I'll make great progress." (Eva, SHS)

4. Impeding events

72 (38%) of the 191 analyzed events affected the doctoral process and the student's subjective well-being in a harmful way. The most frequent emotions resulting from those events were frustration (35%), stress (32%) and anxiety (29%). These unpleasant emotions arose separately or jointly (emotion blends), when basic psychological needs were thwarted, i.e. when students felt incompetent, saw their efforts, plans or ambitions hindered, thought that their opinions, goals, needs or resources were disregarded, were not given the expected support.

Need



Need Support

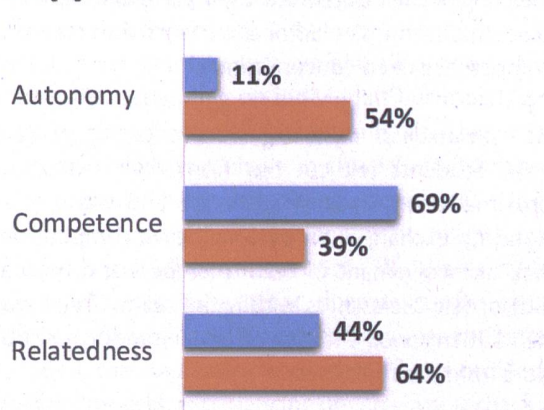


Figure 1. Frequency of need satisfaction and need support in emotionally significant facilitating events (n=93) and thwart in impeding events (n=72).

4.1. Need thwarting

The thwarts of competence and autonomy stand out clearly in the event descriptions. The thwart of relatedness appears to a lesser extent.

4.1.1. Competence thwarting (42 out of 72 impeding events | 58%). Students felt incompetent, doubted their capacity to succeed, to meet their supervisor's perceived expectations, and/or to measure up to the norms and practices of the scientific community. They also assessed severely what they had achieved so far (e.g. the quality/quantity of data or analysis, the argument construction); thought the outcome would lack in depth; encountered setbacks (e.g. equivocal analysis or results); felt stuck, going round in circles or getting behind schedule. They mainly questioned their own organization (e.g. planification, tasks consuming more time than expected), but also often compared themselves to others (peers, skilled researchers, etc.).

"I'm reading a very interesting book. I feel that I don't know enough theory, didn't read and think enough in the past years. I have the impression that I will never be able to produce something like this, to argue so well and to make all the theoretical and practical linkages necessary to elaborate such a text." (Sonia, Sciences)

4.1.2. Autonomy thwarting (40 events out of 72 | 56%). The students reported mostly time scarcity and pressure (deadlines); little or no control over daily work and organization (e.g. professional overload, unexpected demands, technical issues, organizational setbacks in research such as participants' dropout, family contingencies preventing work on their doctorate). Occasional health issues constrained their doctoral process over several days or months. Sometimes they felt a low sense of volition or self-endorsement (e.g. doubts about their own decisions, the meaning of their doctorate, their place and career in academic settings). Half of the events thwarted the competence need concomitantly.

4.1.3. Relatedness thwarting (10 events out of 72 | 14%). Students felt cut out from their team and proximal peers (lack of authentic and warm relations, no exchanges on personal level, competition, lack of involvement of team members and mutual aid) or felt uselessness within the team. Three students mentioned the lack of understanding or support from their relatives.

"We are not a team. It's every man for himself. People choose with whom they go for lunch based on the person's reputation and how it can benefit them. I don't care about titles or such things. The person itself is what matters. Situations like that make me doubt to continue in that job." (Maria, SHS)

4.2. Constraining environment

In 28 (39%) of the 72 impeding events, students explicitly reflected on their research environment, mentioning most frequently rejection, control and chaos practices.

4.2.1. Rejection (18 events out of 28 | 64%). Students mentioned mostly difficulties in the relation with their supervisor: lack of availability when support was needed (e.g. feeling of being neglected or left to one's own devices); perception of unethical or inappropriate behaviors (e.g. demands and situations the students deemed illegitimate or damaging for themselves or their research, pressure to work on weekends); lack of recognition for the work carried out or one's involvement; conflict and tension in the relation (e.g. feeling psychological insecurity, rude interactions, no personal concern). Students also

expressed a few unfulfilled expectations towards the research team, or peers.

4.2.2. Control (15 events out of 28 | 54%). Activities that are imposed, too tightly defined to allow for any leeway in their handling, means or contents, or seen as disregarding the students' opinion, goals, needs or resources. Time pressure because of deadlines set by others (e.g. supervisor's agenda, submission deadline, end of contract or grants).

"I have so much to do for the assistantship and lots of private things for my supervisor that I think he should do himself (e.g. his parking sticker, [...]). This succession of small tasks is very time consuming. I have not touched my research for weeks ... it's very frustrating because the deadline for submitting my paper to a conference approaches. I would like to clone myself." (Alice, Economics and Social Sciences)

4.2.3. Chaos (11 of 28 events | 39%). Lack of, negative or contradictory feedbacks, lack of guidance or tutoring, and little support perceived to publish or to network.

"A discussion with doctoral colleagues made me aware of the difference between their progress and mastership and mine. Some of them work on their fourth article, others are writing book chapters, while I had not yet the opportunity to write a single article. I think it is because they work in the research team of my supervisor, with many more opportunities to communicate." (Julie, SHS)

5. Ambivalent events

26 of the 191 analyzed events (13%) showed opposed effects. Adaptive regulations (e.g. stocktaking, planning) were beneficial to the doctoral process but affected negatively the students' well-being when their (not extensible) resources reached their limit under time pressure. The perception of the social context was also ambivalent: while students saw formal and non-formal contacts as interesting, and nurturing progress (e.g. for feedback, affective support), they also experienced them as sources of stress, fear and anxiety (e.g. image as professional; comparison, etc.).

6. Discussion

The satisfaction of the three basic and interconnected needs of competence, relatedness and autonomy is a requisite for the well-being of doctoral students. Put metaphorically, "well-being is like a three-legged stool; pull out any one of these supports and the stool will fall" (Ryan & Deci, 2017, p. 256).

The students' need of competence emerges prominently, in line with earlier studies. In facilitating

events, the sense of moving forward with one's research (e.g. refining the project, finding new theoretical elements, collecting data, obtaining results, proceed in writing) stands out, whereas when facing obstacles (e.g. work overload under time pressure, be stuck in complex analyses without a resource person, inconsistent results, non-acceptance of submission, feel controlled, face unforeseen circumstances), students tend rather to doubt themselves, their skills, and their motivations.

Social interactions are crucial in both types of events. In facilitating events, they are significant providers of landmarks, particularly in "hidden" or non-formal activities. Doctoral students are in a complex learning and professionalization process to become researcher. The supervisor (mostly), peers, members of the team or of the broader scientific community help them to appreciate what contents, methodologies, practices, or behaviors have more value and meaning, which ones have less, and why (Ryan & Deci, 2017). In contrast, except for some formal events (e.g. certifying activities, trainings), the environment does little to help students acknowledge the skills they improved. Indeed, structure and implication practices appear largely as environmental affordances in the facilitating events, supporting the process of internalization of social practices (Ryan & Deci, 2017). Yet, their proximal and distal networks also help the students to find their places as members of the scientific community.

In impeding events, many students tend to have doubts about themselves, not only regarding the regulation of activity, but questioning their ability to complete the doctoral degree, their motivation or their place in academic settings. This raises the question as to whether the students internalized the inclination of the scientific community suggested by McAlpine et al. (2012), and therefore see themselves as the source of every difficulty without considering little that the problem may be structural or conjectural. Moreover, substantial identity processes take place during doctoral studies, as highlighted by the European project "Researcher Identity Development²". Our results show how emotionally ambivalent some students can feel about their proximal and distal network. When they perceive their ineffectance in handling certain situations, they may see others as a threat (for their self-conception or their feeling of legitimacy within the community, thus steering up self-preservation or defense strategies) rather than seeing others as an opportunity to learn and progress. Taking the assumption of Devos et al.

(2016), it seems that relatedness satisfaction and its supports "oils" the doctoral process by facilitating structure (e.g. taking in feedback) and autonomy.

Being autonomous does not mean working detached from others, without any influence or dependence (independence), nor does it mean to operate without constraints (freedom). Autonomy means "acting in accord with one's reflective considerations" (Ryan & Deci, 2017, p. 51), thus accomplishing actions characterized by self-endorsement (tied to values, interests, etc.) and volition (e.g. operating choice, regulation).

In our results, autonomy appears much more frequently when students feel it thwarted than when it is satisfied. This could be because autonomy is a "vehicle" through which other needs are actualized (Ryan & Deci, 2017) – autonomy being rarely mentioned in facilitating events because it is not blocking the satisfaction of other needs. However, autonomy can't be taken for granted. It is variable and potentially vulnerable, depending on individuals but mostly on support given by the social environment. Thwart of autonomy appears globally in three circumstances: 1) work under perceived duress and coercion (e.g. conflict with values, interests, opinions, intentions); 2) difficulty to juggle and reconcile all spheres of life (e.g. employment as assistant, doctoral studies, family care and social life), to manage resources and time; 3) facing the unpleasing meanders of the ordinary research process, experiencing uncertainty, setbacks, wanderings, unforeseen situations.

In the first two cases, students cannot act with full volition, nor contribute with their whole resources, interests and capacities. The danger when the context fails to support autonomy, is that students are less likely to learn and internalize values, attitudes, or behaviors of the reference group. The internalization process will rather have the quality of introjection (in a sense of one "must" or "should" do something, or feeling anxiety, self-disparagement), thus being conflicted, rigid, or marked by negative emotionality (Ryan & Deci, 2017). For instance, when a positive informational feedback is delivered in a controlling style, the potential effect of competence information is not only neutralized but could also undermine intrinsic motivation (Ryan & Deci, 2017). Supporting students' autonomy implies to be responsive to their point of view, state of knowledge and skills, as well as to important issues they might face. Providing autonomy is offering an evolving framework in which doctoral students can grow, progress, then initiate meaningful and self-endorsed choices (e.g. choose certain axes of their research) and build their own researcher posture. That also means ensure a work

² <https://www.researcher-identity.com/> (3 October 2018)

Recommendations for people interacting with or supervising doctoral students to create supportive environments (adapted from Ryan & Deci, 2017)

Autonomy supporting practices

- Clarify own role, expectations and limits
- Understand and relate to the doctoral student's perspective (e.g. values, interests, aspirations, learning project)
- Provide choices and meaningful inputs (e.g. options that were overlooked)
- Provide a meaningful rationale for activities (trying to include the student's perspective)
- Be responsive to questions and comments
- Consider carefully the use of incentives or controlling pressure because of their potentially damaging effects on motivation (avoid them if possible)
- Consider employments' conditions of students (esp. in case of double duty as supervisor and head)
- Suite the accompaniment practices to student's progression and needs within the studies.

Competence supportive practices - provision of structure

- Offer constructive informative feedback (versus pointing out insufficiencies, mistakes, etc.)
- Acknowledge signs of mastery and improvement
- Encourage and accompany autonomous reflection (e.g. identification of obstacles and concerns, problem solving)
- Clarify implicit values and practices within the scientific community
- Provide expertise and scaffolding
- Help building network (esp. for students with individual research projects)

Relatedness supportive practices - provision of implication

- Dedicate (quality) time
- Take interest in the person
- Create a secured and trusted relation involving authenticity, empathy, openness
- Acknowledge the student's experiences and feelings

Figure 2: Recommendations for people interacting with or supervising doctoral students to create facilitating environments.

environment that enables opportunities to practice and acquire knowledge and skills (e.g. honor employment contract and allow time for the doctoral work or trainings, provide a suitable infrastructure).

The third case of thwarting autonomy could emphasize the vision (especially novice) students have of a "good" researcher or research process. The production of the thesis requires a series of high level academic competences in relative autonomy compared to the learning achieved so far at Bachelor or Master degrees (Frenay & Romainville, 2013). Having seen mostly completed outcomes (e.g. publications), students could be only little aware of the iterative nature of the research process, with its headways and setbacks, wanderings, refinements and rewritings, that their supervisor and other skilled members of the scientific community also commonly experience. They could still be little equipped to regulate

and handle such unpleasant fluctuations. Scaffolding activities with experts, open discussions with the supervisor about such experiences, engage in junior researcher associations in the field (to organize conferences, participate in review process, etc.) are just a few ways that could support this learning process.

Lastly, in the emotional rollercoaster experienced during the doctoral journey, stress was expressed by more than 80% of the students and often assessed as chronic. Like anxiety and despair, stress can, in case of long-term recurrence, lead to exhaustion, psychological distress or psychological disorders (Nevid, Rathus, & Greene, 2009). As emphasize in the introduction, these results are worrying in view of the risky context in which doctoral students evolve (e.g. duration of studies, evaluation, high competition).

On the brighter side, contentment was very frequently verbalized by almost all participants. This state of being satisfied and comfortable with the actual circumstances, of feeling a sense of accomplishment, should, when often experienced, sustain individuals in building self-knowledge and refining their value systems (Fredrickson, in Sander & Scherer, 2009a) as well as reinforce involvement and ties to others (relatedness). Relief, hope, and interest were also frequently reported. These approach emotions stimulate exploration, creativity and learning. They are associated with effort, persistence and reduction of distress (Tran, in Sander & Scherer, 2009b). They are thus a powerful lever of learning and research processes in higher education.

The health and persistence of doctoral students cannot be reduced to an individual matter. They also depend on how environmental conditions support or thwart their thriving (Ryan & Deci, 2017). The flourishing of students includes not "only growing in cognitive skills and knowledge but also developing and strengthening personal and social skills" (Ryan & Deci, 2017, p. 380). By sustaining the satisfaction of doctoral students' needs, the people who support them do provide an environment conducive to well-being, motivation, learning, performance and creativity, but are also facilitating their professional socialization. Recommendations in this regard are proposed in Figure 2. See also the booklet³ on doctoral supervision edited by Dr. Marie Lambert and Prof. Bernadette Charlier, and published by University of Fribourg Didactic Center.

7. Limits and perspectives

³ <https://www3.unifr.ch/didactic/de/services/accompagnement/accompagnement-des-doctorants/>

This research does not give a voice to supervisors and institutions on their roles, responsibilities and their representation of supervision or its quality. Nor does it question whether their conceptions match the expectations of the students. More research is needed in this field.

Regarding the number of volunteer participants (26), the generalization to all doctoral students in Fribourg and other contexts should be made with caution. Nevertheless, our methodology has provided rich data, which complements the findings of Marie Lambert⁴ who, in her thesis about the professional development process of assistants and doctoral students, emphasizes the crucial role of the organizational context framing the studies (e.g. working conditions) and of the proximal peers and teams as significant resources, as well as the ambivalent relation to the supervisor. Our findings are also, in many aspects, in line with the above-mentioned Europa Studies.

An essential aspect that needs yet to be considered, because it also distinguishes those who complete their studies from those who don't, is the students' involvement in a project that makes sense (Devos et al., 2016), and meaningful motives underpinning their engagement, for example wanting to solve vocational problems (Vekkila et al., 2013). The aspirations (the "what" – intrinsic versus extrinsic goal contents) and the motivational orientations (the "why" – auton-

omous versus controlled regulation), also make the difference in health, as a component of the eudemonic well-being process (Ryan & Deci, 2017). Forthcoming analyses will focus on understanding these motivational aspects in key events. How do students with an intrinsic motivational profile react when activities don't interest, stimulate or absorb them? How do they persevere? Identified regulation – i.e. seeing the personal relevance of activities like discovering tools for the aspiring professional career – should sustain the learning and internalization process, as Vansteenkiste et al. (2018) suggest. Do such orientations help students to overcome intrinsic motivation fluctuations? Finally, are students with introjected regulation orientations, namely acting tendentiously e.g. by guilt, shame, or seeking approval of others, having more difficulties to engage in social interaction (e.g. ask for help, participate in activities)? Such in-depth knowledge will help to refine supervision practices by taking into consideration the singularity of the doctoral students and the particularity of their journey.

Although significant progress was made over the past 15 years, it is still necessary to improve the context in which the next generation of researchers will be trained to become creative, critical and autonomous intellectual risk takers, while preparing them for a variety of careers that require deep rigorous analysis⁵. The stakes are not only immaterial in terms of knowledge, but also financial (e.g. health costs) for the academic sector and for society. ■

⁴ Lambert, M. (2013). *Être assistant et se développer professionnellement? Recherche descriptive et compréhensive sur le développement professionnel des assistants à l'Université de Fribourg* (Thèse de doctorat). <https://doc.rero.ch/record/232541/files/LambertM.pdf>

⁵ <https://www.leru.org/files/Maintaining-a-Quality-Culture-in-Doctoral-Education-Full-paper.pdf>

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