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Who takes care of safety and health among young workers? Responsibilization of OSH in the platform economy

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ABSTRACT

This study explores how young workers experience employment relations and responsibility for Occupational Safety and Health (OSH) in the platform economy. The study is based on 29 qualitative interviews with young Nordic workers (age 18–30) who find work through digital labour platforms and social media platforms. The European Agency for Safety and Health at Work asserts that the placement of responsibilities for OSH in the platform economy is challenged by the unclear categorisations of employers, employees and self-employed, and that existing labour law and OSH legislation might be inapplicable. Even though most platforms position workers as self-employed, the study shows that the young workers rarely experience themselves as being self-employed and assume that the platforms take care of OSH. When operating in this grey zone, the young workers risk being left without protection and societal resources for improving their OSH. Rasmussen's model 'migration towards the boundary of unacceptable safety performance' is used to discuss how work activities in platform work is driven by strong cost and effort gradients, while, the counter gradient, in terms of OSH systems, at the same time is very weak or completely absent.

1. Introduction

Digital technologies, such as artificial intelligence (AI), advanced robotics, exoskeletons, mobile devices and online platforms are developing at a fast pace of change. Such new technologies are paving the way for new modes of organizing and controlling the nature of work (Coyle, 2017), which adds complexity to the work processes, and thus posing new challenges for the management of risks at the workplace (Rasmussen, 1997). Moreover, these digital technologies have enabled the emergence of various digital platforms, in what is termed the platform economy or the gig economy¹. Digital labour platforms are commercial online platforms (such as Handyhand and Freelancer), which mediate services and tasks that can be delivered either locally or remotely (Huws, 2015). In addition, social media platforms (such as YouTube and Twitch) have enabled new types of work (Nielsen et al. 2019; Abidin et al 2020). These developments in technology and new ways of organising work are transforming employment relations and the possibilities for

prevention of occupational safety and health (OSH) problems among workers, particularly young workers, who are the focus of this paper, since they as a group is more prevalent on the digital platforms (Ilsoe & Madsen, 2017; Popescu et al., 2018). Research in this field is still on an early stage, and knowledge about the connection between platform work and OSH is not very well covered, and empirical studies in particular are lacking.

Current understandings of work and employment relations are challenged by the continuous emergence of new forms of work and work arrangement, which are often deemed precarious (Antonucci et al., 2014; Casas-Cortés, 2014; Kalleberg, 2009; MacDonald & Giazitzoglou, 2019). Scheuer (2017) proposes that these new forms of work:

[have] given rise to a somewhat blurred distinction between employee and the self-employed, which may have led to an increase in the number of people in this 'grey zone' (...). Employers may, in some cases, benefit from

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¹ The term 'platform economy' is often preferred by labour unions and governmental institutions, while the term 'gig economy' is commonly used in research articles. We use the term 'platform economy' because the term underscores the centrality of digital platforms in this new economy. In addition, we find that the term 'gig economy' excludes other types of new work arrangements which cannot be defined as gig work, such as making a living by being an e-sports gamer.

applying this terms of employment (...) as it significantly reduces employer obligations” (Scheuer, 2017, p. 85, translated by the authors).

Workers in the platform economy can be said to comprise a subgroup within this ‘grey zone’ between being an employee and a self-employed person (Huws 2015; Ilsøe 2017; Jesnes et al., 2016; Manyika et al., 2016) because categories such as employer, employee, and self-employed are not easily applicable in the platform economy (Garben, 2017; Standing, 2016; Weber, 2018). Digital labour platforms often refer to platform workers as entrepreneurs and independent contractors (Prassl, 2018; Todolfi-Signes, 2017; Zwick, 2018), which leaves them without employee protection, because the responsibilities for OSH are relegated to the workers on the platforms. Scheuer (2017) points out that this ‘in-between’ group is often left without protection because they are not categorised as employees. Also, as noted by Nielsen et al. 2019, these types of work are not in the scope of the labour inspection authorities, and are not receiving the attention and resources from occupational safety and health professionals. Thus, these new employment relationships create ‘protective gaps’ for this group of workers, including gaps in employment rights, gaps in social protection, gaps in representation, and gaps in enforcement of rights and OSH (Grimshaw et al., 2016; Nielsen et al. 2019).

Several European Member States acknowledge the existence of a third group on the labour market that operates in the ‘grey zone’ between employee and self-employed, and the terms solo self-employed, bogus self-employed, and ‘economically dependent self-employed worker’ are some of the terms used to describe them (Narvaiza, 2011). This phenomenon is not restricted to the platform economy, but is also seen in the construction sector (Arnholtz et al., 2018; Verzhinina et al., 2018) and in the German meat industry, where subcontracting has been introduced in slaughterhouses (Wagner & Refslund, 2016).

One of the most well-known labour platforms is the app-based taxi service Uber. Uber was one of the first foreign labour platforms to come to Denmark in 2014. Shortly after their arrival, the Danish Transport Authority reported Uber to the police. Together with the Danish Taxi Council, they claimed that Uber was an illegal taxi service because the company violated the Danish Passenger Transport Act by driving in non-approved cars and using non-certified drivers. Later that year, prosecutors filed charges against Uber. In 2017, Uber announced that they closed their Danish branch due to a new political agreement on the Taxi Act (Kristiansen & Andersen, 2017). This did not prevent other digital labour platforms from establishing their businesses in Denmark. Since 2014, a number of labour platforms have emerged (Ilsøe & Madsen, 2021).

The issue of digital management and control of work in the digital labor market is currently under debate, because these changes lead to a lack of clarity as to who is responsible for the working environment in the digital labor markets.

It is typically young people who are engaged in platform work (Balaram et al., 2017; Garben, 2017; Ilsøe & Madsen, 2017; Popescu et al., 2018), and the young workers are known to have higher risks of work injuries compared to their older colleagues (Dyreborg et al. 2019; Nielsen et al. 2018; Nielsen et al. 2013; Nielsen et al. 2017, European Agency for Safety and Health at Work, 2007; Garben, 2017). For this reason, it is paramount to examine young workers’ perceptions of their employment relations² when they work via digital platforms and what happens with the responsibility for OSH. This paper thus examines how young workers on digital platforms experience their employment relationships and how responsibility for OSH is affected. We also provide a discussion of the possible consequences for health and safety at work.

² Rather than using the term employment relationship as a reference to a relationship of dependence between an employer and employee, we use the term more broadly to refer to people in employment (opposed to unemployed) which encompasses employees, self-employed, solo self-employed and so forth.

2. Health and safety on digital platforms

There is still limited research that specifically focuses on OSH among persons working via digital labour platforms and social media platforms. Work via online digital platforms resembles temporary and ‘nonstandard’ employment forms, which are characterized by a poor working environment, increased risks, and weakened social conditions (Garben, 2017; Nielsen et al., 2019). Offline work, mediated through digital labour platforms, often encounters the same kinds of OSH risks as seen when the same work tasks are performed within standard employment forms, e.g., lack of safety training, lack of safety equipment and lack of breaks (Jesnes et al. 2016; Huws 2015). Previous research also suggests that the risks of strain injuries and work accidents are very much dependent on whether work is done online or offline (Huws, 2015; Jesnes et al., 2016; Nielsen et al., 2020).

However, digitalization adds a number of new mechanisms, which can reinforce some of these traditional OSH risks (Huws, 2015; Prassl, 2018). In continuation of this, previous literature has noted that digitalisation can intensify work by increasing the pace, surveillance, and working hours, and that the technology contributes to a boundaryless working life (Gregg, 2011; Nielsen et al., 2019; Prassl, 2018; Samant, 2019; Wood et al., 2018). A number of studies suggest that risks in digitally mediated work are linked to the platforms’ use of ‘algorithmic management’ (Lee et al., 2015; Möhlmann & Zalmanson, 2017; Nielsen et al., 2020).

Multiple studies of ride-hailing platforms (Chen, 2018; Lee et al., 2015; 2017; Möhlmann & Zalmanson, 2017; Rosenblat & Stark, 2016) find that the non-transparency of the algorithms used on the platforms causes drivers to feel a sense of unfairness and a loss of autonomy. Ratings also serve as a control mechanism on the platforms (Gandini, 2019; Raval & Dourish, 2016; Wood et al., 2018) and several researchers assert that evaluation through rating systems can cause stress among workers (Garben, 2017; Huws, 2015; Jesnes et al., 2016), and have negative psychosocial impacts (Lee et al., 2015). Additionally, workers on digital labour platforms may have difficulty navigating or rejecting transgressive behaviour from customers because they fear poor ratings, and thereby their opportunity to maintain an income (Chen, 2018; Moore, 2018; Wood et al., 2018). Finally, digitized management methods can lead to detailed monitoring and ‘cyberbullying’ (Moore, 2018). Online workers, such as influencers on social media platforms are particularly vulnerable to being targets and victims of cyberbullying (Abidin, 2019).

Introduction of safety learning routines and instruction is a classical approach to prevent occupational accidents (Hale, 1984; Kjellén, 2000), including work injuries among young employees (Danish Working Environment Authority, 2015). However, since most workers in the platform economy are considered self-employed, no one, besides the workers themselves, has the formal responsibility for safety introduction and learning. Therefore, these workers receive very little or no introduction to work and safety training (Nielsen et al., 2019; Nielsen et al., 2020; Nielsen & Laursen, 2020). However, the risk of work-related accidents and injuries might be more prevalent in platform work due to the temporary and task defined nature of the work, which is known to correlate with the risk of injuries (Garben, 2017; Nielsen et al., 2018). Additionally, the responsabilization of the platform workers to take care of the OSH problems themselves in combination with the absence of authorities and resources for the prevention of OSH problems among these young workers, can further increase their risks at work.

3. Method

3.1. Data collection

The paper builds on 29 qualitative interviews with young workers between 18 and 30 years old in the Nordic countries who find work in the digital labour market. The workers on social media platforms are

Table 1
Overview of participants and experienced OSH risks.

Type of platform	Interviews	Age and sex	Experiences of OSH risks
Online digital labour platforms (WorkSome, 'Din tekst forfatter', Freelancer)	6	2 women 4 men 21–28 years of age	<ul style="list-style-type: none"> • Lack of colleagues, training and support • Borders between work and private life are highly blurred (availability 24/7) • Dependence on non-transparent algorithms and ratings • Reported neck and back pains, stress-related illness
Location based digital labour platforms (Wolt, HandyHand, Chabber, Care, Dogley, Hilfr)	8	3 women 5 men 19–25 years of age	<ul style="list-style-type: none"> • Lack of colleagues, training and support • Borders between work and private life are highly blurred (availability 24/7) • Insecurity and- or physical hazards related to working in foreign homes • Strains derived from the affective work- and relationship with customers. • Dependence on non-transparent algorithms and ratings • Risks of accidents depended on the work performed
Social media platforms (YouTube, Facebook, Instagram and personal blogs)	11	5 woman 6 men 20–32 years of age	<ul style="list-style-type: none"> • Long working hours • Borders between work and private life highly blurred • Missing colleges (isolation) • Stressful to maintain affective relationships with followers and viewers • Hard tone, hatred, or even online threats • Stress and sleeping difficulties • Neck and back pain
Professional gamers (livestreaming on Twitch)	4	1 woman 3 men 21–27 years of age	<ul style="list-style-type: none"> • Long working hours • Borders between work and private life are highly blurred. • Missing colleges (isolation) • Harsh tongue or hate speech • Stressful continuously to maintain affective relationships with followers and viewers • Irregular, evening and night work (adjusting to time zones for tournaments and when subscribers are active) • Demanding physically and psychosocial work tasks with high intensity. • Neck and shoulder pain, sleeping disorders and stress-related symptoms and illnesses.
Total	29	11 women 18 men 19–32 years of age	

gamers, YouTubers, and Influencers, whereas workers on digital labour platforms are cleaners, dog walkers, couriers, waiters, babysitters and the like (Table 1). The data were collected via two research projects during 2016–2019. In the first place, the platform workers were recruited through open invitations to participate in the project via the digital labour platforms' own newsletters and Facebook groups, but this approach was unsuccessful. We therefore contacted the young platform workers via other channels: Directly through their profile on the digital platforms; via their contact information on the platform; via Facebook Messenger; via the researchers' network; or contacted if we saw them in the street with a logo or company equipment indicating affiliation with a platform. Fourteen out of these 35 young people agreed to participate.

Young workers on social media platforms were recruited using the young people's own publicly available online contact information, through contact with influencer agencies, and through the researchers' networks. Fifteen out of these 22 young people agreed to participate.

The interviews were conducted at the time and place that suited the worker and lasted 1–1.5 h. The young workers were asked about their life situation, work routines, work organisation, pay, social and economic risks, and OSH risks, including whom they would contact if injured. Quotes are translated from Danish. The participants' personal information is handled in accordance with GDPR, and thus original names and personal identifiers are pseudonymised.

In addition to the interviews, we collected the Terms and Conditions from the different digital labour platforms where the young workers were signed up. The Terms and Conditions can be considered official documents from the platforms (Bryman, 2016), and they provided us with insights into how they define the users of the platform, their restrictions, and the division of responsibilities. Finally, the project has been conducted as a collaborative process with inspiration from the Canadian Knowledge-Transfer-Exchange Model (KTE model) (Van Eerd, 2017). Thus, all phases of the project have been developed in close

dialogue with stakeholders. This was done during six workshops, where representatives from Unions, representatives for platform owners, Influencer agencies, and the OSH authorities participated and contributed to the discussion and interpretation of the study. This provided the project with unique insights into the work of the various actors in the platform economy.

3.2. Analytical approach

All interviews were transcribed verbatim and thematically coded (Braun & Clarke, 2006) in NVivo 12. The thematic codes chosen for closer inquiry for this particular paper were 'physical and psychosocial work environment', 'work conditions', and 'help and support in the work'. We read the coded excerpts from all 29 interviews, and within these codes, we looked for the young workers' narratives of the employment relationships in their work on digital platforms. The seven cases represented below were chosen because they represent three different forms of digital platforms and because the interview quotations provided a rich and detailed insight into the workers own experiences of their employment relations. The Terms and Conditions from the different digital platforms included in the analysis were read with a specific focus on the platforms' positioning of themselves, the workers, and the customers.

Rather than examining OSH risks in the Danish platform economy, this study seeks to unfold the 'grey zone' of employment relations and to outline the various risks and responsibilities for OSH on digital platforms. The risks found in this material are reported in Table 1 and constitutes a follow-up on analyses presented elsewhere (Nielsen et al., 2019; Nielsen et al., 2020).

3.3. Theoretical approach to risk and safety at work

The organisation of work via online platforms adds complexity and increases the opaqueness of the responsibility for occupational safety and health in platform work. In this way, platform work represents a business model that entails fragmentation of workplaces and disruption of OSH responsibilities, as Weil (2019) refers to as ‘fissured workplaces’, which involves companies outsourcing what is not their central business activities, while they still maintain in tight control of the outcomes of those subsidiary activities, by introducing incentive systems supported by increasingly sophisticated software (Weil, 2019), such as algorithmic management systems (Laursen, Nielsen & Dyreborg, 2021).

Rasmussen’s (1997) dynamic safety model, i.e., migration toward the boundary of unacceptable safety performance, addresses these dynamic aspects of safety in a complex work system (Waterson et al., 2017). The model is based on the principle of functional abstraction, which makes it suitable for many types of work systems, including platform work, and the situational mechanisms that may lead to injuries (Cook & Rasmussen, 2005; Le Coze, 2015). Rasmussen’s ‘functional abstraction’ perspective to model processes involving safety and risk, implicates attention to how workers are influenced by economic cost reduction and workload pressures that drive work activities towards the boundary of unacceptable safety performance. In their media coverage analysis of the platform economy, Nilsen et al. (2020) applied Rasmussen’s model in their discussion of factors that could potentially affect the safety and working conditions of workers in the platform economy. Inspired by Nilsen’s et al. (2020) use of Rasmussen’s model, we examined the basic mechanisms underlying the safety and health risks related to the business models shaping the work activities on digital platforms.

4. Analysis and results

First, we offer a categorisation of different digital platforms. Second, we outline the employment relations on digital labour platforms and social media platforms. Finally, we explore the young workers’

narratives of employment relations and OSH responsibility on the two forms of digital platforms.

4.1. Categorisation of digital platforms

Based on the literature and empirical material, we suggest a categorisation of the platform economy, as presented in Fig. 1 below. As can be seen from the figure, the different platforms in the platform economy mediate different types of work. This article focuses on the two main groups, ‘digital work platforms’ and ‘social media platforms’, including their subcategories.

4.2. Transformed employment relations on digital labour platforms

Digital labour platforms mediate the supply and demand of services

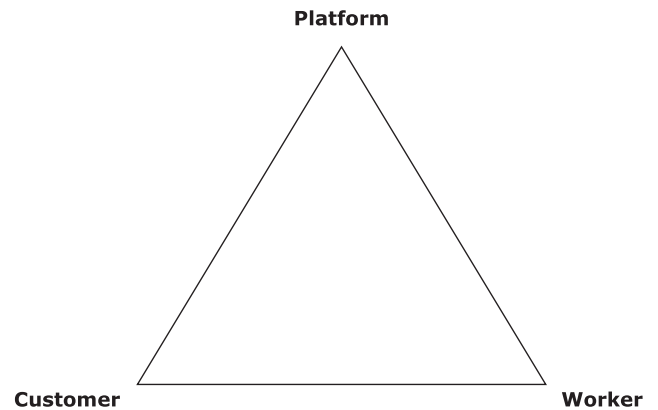


Fig. 2. Digital labour platforms: A three-sided employment relationship.

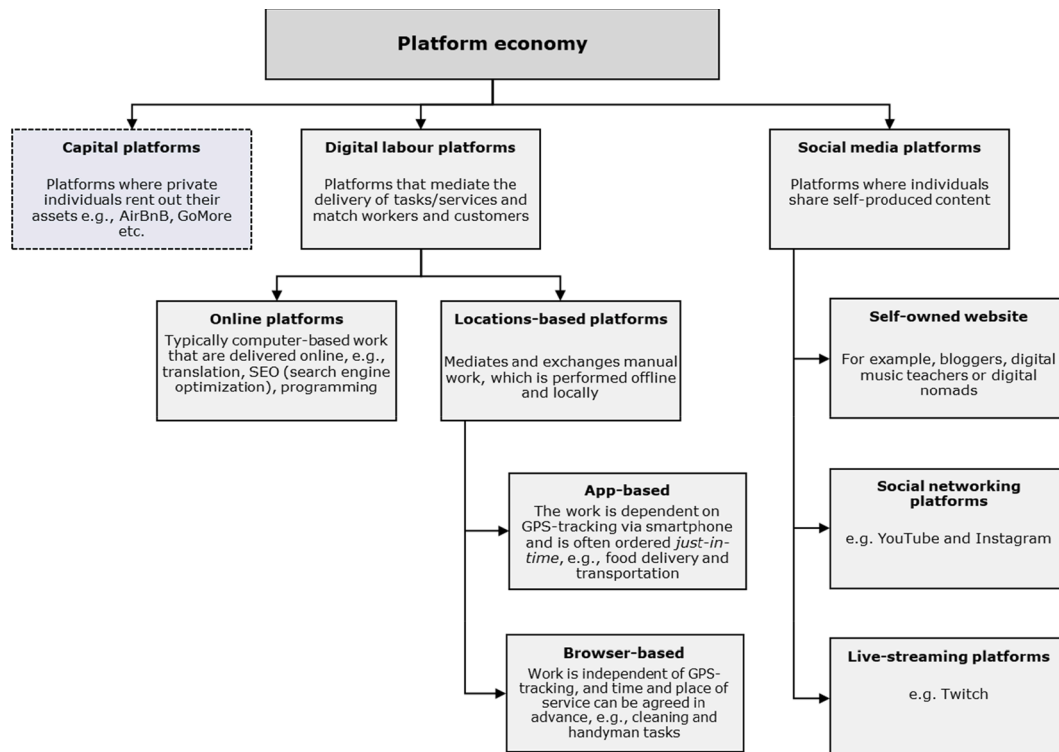


Fig. 1. Different categories of digital platforms in the platform economy.

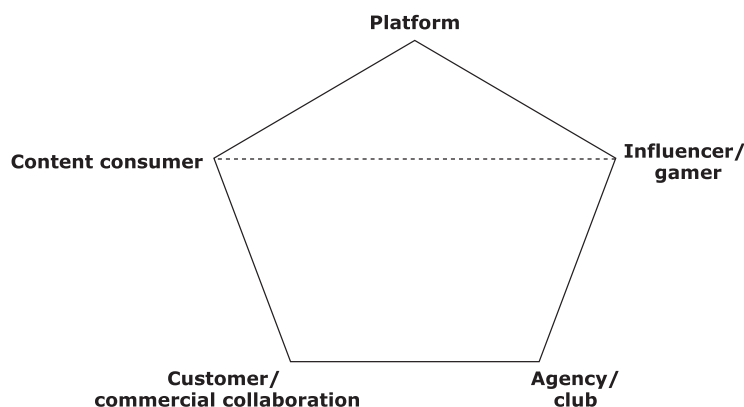


Fig. 3. Social media platforms: A five-sided employment relationship.

and tasks between workers and customers. Thus, instead of a two-sided (dyadic) relationship between an employer and an employee, there is a three-sided (triadic) relationship between a digital platform, those who work, and the customer who receives the service (Jesnes et al., 2016; Kristiansen & Andersen, 2017), as illustrated in Fig. 2. In this way, the digital labour platforms constitute a new actor that mediates, and by that also controls, the transaction between worker and customer (Prassl, 2018).

Due to this three-sided relationship, the traditional categorisations of employer, employee, and self-employed are not easily applied in the platform economy (Garben, 2017; Standing, 2016).

The European Agency for Safety and Health at Work asserts that the current legislation is not aligned to the conditions of the platform economy and suggests that the vague categorisations of employers and employees on platforms complicate the placement of OHS responsibilities. As a consequence, the awareness and care for health and safety regarding work activities fall between these various actors. Furthermore, the legislation varies across national borders; therefore workers fall into different categories across member states of the European Union (Garben, 2017).

4.3. Transformed employment relations on social media platforms

Another kind of paid activity that has emerged with the digital revolution is carried out by persons/influencers/gamers earning money by producing, posting, and streaming content on digital social media platforms (Abidin, 2019; Abidin et al., 2020). This includes, for instance, uploading videos onto YouTube or streaming a Counter-Strike game on Twitch (Johnson & Woodcock, 2017). Then there are the people who view the content, whom we label 'content consumers', rather than customers. Finally, there is the platform itself where the content is being published. Besides this three-sided relationship, the influencer/gamer can be affiliated with an influencer agency or club, and the influencer/gamer can engage in commercial collaborations with companies who, for instance, pay the influencer/gamer to advertise a product (Abidin et al., 2020). In this way, the companies can be perceived as the influencer/gamers' customers. As illustrated in Fig. 3, paid activities on social media platforms can involve a five-sided relationship.

While the types of work carried out across the two types of platforms - social media platforms and digital labour platforms - are arguably very different, they also share common features. The most important similarity is that work activities across the two types of platforms are both enabled and conditioned by the platforms, which challenges the traditional labour market legislation and the division of workers into employees or self-employed (Garben, 2017; Standing, 2016). Additionally, while employment relations can be debated, most workers on the two types of platforms are currently classified as self-employed, even though

the platforms to a very large extent control and manage the task performance. For this reason, we see it as an analytical opportunity to explore workers' experiences of their employment relations and responsibilities for OSH across different types of digital platforms.

4.4. Employment relations and OSH responsabilization on digital labour platforms

In the following section, three different digital labour platforms are described. The three platforms were chosen because each of them exemplifies different employment models. The presented example quotes from the interviews³ serve to illustrate the young workers' different narratives of how transformed employment relations and responsabilization for OSH are experienced. The first platform, Dogley, is a locationbased work platform offering dog walking and dog sitting. This platform positions workers as self-employed. The second platform, Hilfr, is also a locationbased labour platform offering cleaning services. On this platform workers can both be freelancers and employed directly by the platform. Finally, the digital labour platform Chabber functions as a digital agency for temporary workers and employs all workers as hourly waged temps. At Chabber, restaurants, events, and private customers can book freelance waiters, bartenders and kitchen help. Despite the platforms' different employment models, the young workers' narratives of their employment relationships on the three different platforms have some similarities.

4.4.1. Dogley: 'Strange to have an employer who is so invisible'

Ditte is a 24 year old student with a profile on the platform Dogley. Here she is booked by private customers to walk their dogs. Ditte explains that to be accepted by the platform, she had to have a job interview by phone.

I received a call from a woman from Dogley. Now that I had applied for the job, she wanted to know why I wanted to work at Dogley, and she wanted to hear about my relationship with animals. It was a very informal, pleasant conversation where she just wanted to know a bit about me and my motivation. (...) She said that it sounded fine, and a short while after my profile was created in the system.

Based on the quote, one would assume that Dogley employs Ditte, since Dogley hosted a job interview. According to Ditte, Dogley is her employer even though she is aware that it is an untraditional employment relationship; 'it is strange to have an employer who is so invisible'

³ We have not had access to the young influencers'/gamers' contracts, and for this reason we do not know the specifics of the contracts.

she says. Dogley, on the other hand, makes it explicitly clear in their terms and conditions that they are not employers and that they have no part in the agreement between workers and dog owners (Dogley, 2018). They describe themselves as a platform where dogwalkers can post adverts for services (Dogley, 2018). However, they take a service fee of 18% from the dogwalkers' pay for managing the payment transactions and insurance for the dog. It is important to note that the insurance is for the dog and not the dog walker. Ditte, however, is of another conviction:

Dogley has an insurance if something happens. So, you can call them, which I would do. I haven't thought that much about it though, because I have never considered that something might happen.

If Ditte is bitten during work, she says she would contact Dogley in addition to the dog owners because she knows Dogley has insurance. She is not aware that the insurance does not cover the worker, only the dog. She perceives her work as a dog walker to be part of an employer–employee relationship.

4.4.2. Hilfr: 'Being far away if you need help'

Hans is 22 years old, and besides his studies he works via the platform Hilfr, which offers cleaning services. Here Hans has a profile, and customers can book him for cleaning jobs by selecting a day and time. Hans can then accept, reject, or suggest another day for the job. Hilfr takes a 10% commission for each booking. Workers on the platform are called 'Hilfrs'. There are two types of Hilfrs, Freelance Hilfrs and Super Hilfrs (Hilfr, n.d.). If a worker has had 100 working hours via the platform, they can (if they so wish) become Super Hilfrs, who are then hired by Hilfr and covered by a collective agreement between the United Federation of Workers in Denmark [3F] and Hilfr (3F & Hilfr, 2018). Hans is a Freelance Hilfr; he is covered by insurance from the platform, but is considered self-employed by the platform. Hans, however, does not consider himself self-employed:

Interviewer: *Do you consider yourself self-employed?*

Hans: *No, not really. I don't really know... No, I actually look at it as if I have a job at Hilfr.*

Hans acknowledges that the work is different from a traditional job because there is no manager giving him instructions, but he says that the distance and having an online platform as a mediator of the work sometimes leaves him feeling quite alone in the work. If a problem occurred while Hans was at a cleaning gig, he says he would contact Hilfr-support, either through the chatfunction on the platform's website or their Facebook page. He has received no training or advice on correct work postures (ergonomics) or other safety issues related to the work. This becomes his individual responsibility, which he is aware of: "There is no supervisor telling you "try to do this then you will last a couple of hours longer".

If we recall Fig. 2 and the three-sided employment relationship, we see that for Super Hilfrs the platform takes employer responsibility. This is not the case for Freelance Hilfrs like Hans. However, the platform does insure the workers, and workers can contact them if problems occur. Another question concerns the customers' responsibilities in this relationship. The customers provide the cleaning equipment and detergents, and Hans has experienced that sometimes the cleaning equipment is suboptimal; for instance, the mop has been too short for him, which led to him experiencing back pain. However, he is in doubt about what to do

in this situation.

Hans: *I don't know if I can allow myself to say, "You have some really shitty equipment".*

Interviewer: *What is holding you back from doing something?*

Hans: *I guess it is the fear that then people will just find somebody else (to do the job).*

Even though it is the customers' responsibility to provide the equipment, Hans is hesitant to point it out if the equipment could be better to improve his work environment. He fears that the customers will choose another Hilfr to do the cleaning next time. Hans is dependent on the customers being happy with his cleaning services: the customers provide ratings and reviews after a cleaning gig, and this influences the likelihood of getting booked for new cleaning jobs. This is an example of how individualistic conditions in the platform economy (Huws, 2015; Jesnes et al., 2016; Prassl, 2018) can cause the worker to neglect OSH in order to maintain an income.

4.4.3. Chabber: 'What are our rights?'

Charlotte is 24 years old and is currently having a sabbatical year. She takes on several jobs, and one of them is as a freelance waitress on the platform Chabber. Chabber employs workers as temporary workers paid by the hour, but it is the customers/companies hiring the workers for a gig who are labelled as 'employers' in Chabber's terms and conditions. The customers/companies are required to 'ensure that the employees are offered the same economic conditions, including salary, retirement and holiday pay, and the same facilities and benefits as the permanent employees.' (Chabber, 2019). The customer determines the duration of a job and the hourly wage but, as stated, the customer must comply with existing collective agreements. Chabber pays workers their salary monthly and deducts taxes, taking a fee of 4.81 Euro for each shift a worker has (Chabber, n.d.-a). Thus, in the three-sided employment relationship model, both the platform and the customer seem to take on some responsibility in the employment arrangement; paying the worker income after tax, reporting tax to the tax authorities, and protecting the worker in accordance with collective agreements and existing legislation.

To work via the Chabber platform, an individual creates a profile and applies for posted jobs, and the customer then selects which workers they want. The customer and the worker then engage in an Employment Agreement. After completion of a job, the worker and customer rate each other. Charlotte tells how during one shift the company altered the agreement:

Charlotte: *At one time, we were 24 waiters. It was a shift from 17:00–00:30, and because we had been so quick to clean up after the event, we were already done by 22:00. [The company] had just sometime before said that we would get paid for the duration we were booked for, even if we were done a bit earlier. Then [the company] said to us: "You will get pay till 22:30, but then you can just go home". It was strange because they had just said we would get paid for two hours more. People stood completely quiet and didn't really know what to say. Because can they do that? We don't know. What are our rights? (...) That was a moment where you as a Chabber were in doubt of your rights.*

Charlotte feels cheated by the company, but is also in doubt of her

rights. According to Chabber's FAQ, Chabber seemingly takes the side of the customer as they allow them to alter the duration of the shifts (Chabber, n.d.-b). Charlotte perceives Chabber as her employer, but within the three-sided employment relationship, her rights and bargaining power seem restricted by the platform. Chabber caters to the customers and allows them to alter the conditions of the employment agreements, such as cancelling or shortening a shift. Thus, Chabber negotiates and determines the agreement for Charlotte's work, which shows that Chabber takes on obligations and responsibilities usually taken on by an employer, which confuses the relationship between the customers employing Charlotte and Chabber. Charlotte is often unsure about her rights; she is, for instance, also in doubt whether she is insured by Chabber. When asked what she would do if she was injured while working, she says:

I don't know. I don't know if you are particularly insured in that matter. I guess if I broke my leg on a Chabber shift I would investigate what I could do. But I am not exactly the most insured person.

Charlotte does not know what she would do if she was injured, and she does not have her own accident insurance. However, in this case, Charlotte is covered by a Chabber occupational injury insurance, in case of an accident at the workplace.

In all three cases, the workers perceive the platform as their employer, even when the platforms take no employer responsibility. The placement of OSH responsibility is experienced as unclear and distributed between all three actors in the employment relationships. This makes it a grey zone, where the workers are left to navigate on their own, which poses a risk.

4.5. Employment relations and responsabilization for OSH on social media platforms

The social media platforms represent an even more complex employment relationship. In this section, we see how an influencer, YouTuber and gamer experience their employment relations and how they perceive the responsibility for OSH in their work.

4.5.1. Influencer: 'In a way, I feel as if I am employed'

Annette is 26 years old and works full-time with social media. She has her own blog, and she also posts content on Snapchat, Facebook, and Instagram. She is a so-called 'influencer' and engages in commercial partnerships with companies who pay her to be an ambassador for the company and to promote them, or their products, on her different social media platforms. Annette characterizes herself as a self-employed. However, she has a contract with an influencer agency, which she almost perceives as her employer:

I perceive myself in a way as being self-employed, even if I have a contract. I have a contract at the influencer agency and feel in a way as if I am employed because I have a desk there. I have colleagues, and I eat my lunch there. But I do invoice them. And I have other sources of income as well. And I am not restricted to be there from 08 to 16. Therefore, I perceive myself as... therefore I am my own boss.

She explains that the agency is her workplace. Four other influencers are affiliated with the agency, and Annette regards them as her colleagues. A telecommunication company has hired Annette through the agency, and they have entered into a partnership. The

telecommunication company is the agency's customer. Therefore, Annette invoices the influencer agency for the work she does for the company.

Looking at Annette's employment relationships, we see that they involve many different actors, as illustrated in Fig. 3. Annette produces content about her life, which she posts on four different platforms where followers can view her content. Besides this, she has a contract with an influencer agency that brokers a contract for a commercial partnership with a company. In this complex employment relationship, she both positions herself as self-employed and at the same time feels as if she is employed by the agency.

In a way, I have two managers whom I can ask anything. They call and nag me about things, for example deadlines, or if they wonder where they can find my posts.

While the agency feels like an employer for Annette, and at times behaves like an employer (by checking up on her, as described in the quote), Annette's contract is as self-employed:

If I should become sick, then I cannot get sick leave. If I do not do the job, I do not get paid.

Annette will not get money during sickness, and she has to establish vacation and pension arrangements for herself. Annette is aware of the difference between an ordinary employment relationship and her own employment relation as an independent.

4.5.2. YouTuber: 'I create YouTube-videos and earn money on ads, sponsorships, and collaborations'

Jeppe is 20 years old, and for two years, he has worked fulltime as a YouTuber. He makes YouTube videos and posts them on his own channel. There are ads in the videos, and in this way, Jeppe earns money when people view his videos. YouTube takes a cut of the ad money, but for every 1000 views, Jeppe earns around 2,40–3,10 EUR. Whether videos are displayed on the front page of YouTube or in suggested videos is influenced by the algorithms on YouTube (van Dijck, 2013).

Besides his income from YouTube ads, Jeppe also has sponsorships and engages in commercial partnerships with companies where he posts videos on his channels as a part of a campaign. Jeppe is a part of a YouTuber agency that procures many of the campaigns for him. His income from YouTube and from the campaigns go through the agency, and they take a cut of 20% from his income. Jeppe thinks this is a fair deal:

They are the ones who procure almost 95% of all the campaigns I have made, so I think it is fair enough that they are paid for this service.

The agency pays Jeppe his income monthly and reports to the tax authorities how much he has earned. Jeppe himself, however, has to pay his taxes. Similar to Annette, Jeppe has a five-sided working relationship.

When asked if he can contact the agency about his working environment, he says 'Yes, one hundred per cent'. But it is clear from the interview that OSH is not something he has given much thought to, because it has not been relevant for him.

4.5.3. Gamer: 'I am hired as a live-streamer'

Rasmus is 23 years old, and since his college graduation, he has earned money as an e-sports gamer. At one point, he played professionally in tournaments on a Counter-Strike team, but now he earns his

money as a live-streamer and as an expert commentator for tournaments. Rasmus has a contract with an American e-sports club as a Counter-Strike streamer. The club has different e-sport gamers for different games affiliated with them. They also have professional teams. Rasmus explains that his role is as a sort of entertainment figure, which means when Rasmus live-streams, he represents the club, and he uses the gaming equipment of the club's sponsors. Rasmus explains the relationship in the following way:

The affiliation is not particularly profound or extensive but more like a... You could say I am self-employed. But I have this contract on the side which gives me a supplementary income. But you could also say it is a sort of security and an employment relationship.

Rasmus gets a fixed income each month from the club. If his stream is doing well, he can get a bonus. Besides this, Rasmus has his own income from his stream by playing ads; additionally, the viewers can pay a monthly subscription to be a part of his channel on the platform Twitch. Viewers can also donate money directly to him. Twitch takes 30% of the income Rasmus makes via Twitch. The e-sport club has negotiated this deal for him; the division for smaller players is usually 50%.

In accordance with Fig. 3, Rasmus uses the platform Twitch to live-stream Counter-Strike games. Similar to YouTube, Rasmus gets ad money when people view his stream. In addition, he gets money when people subscribe to his channel, and followers can donate money directly to him. He is affiliated with a club, which pays him monthly to sponsor the club's customers by using their gaming equipment. This constitutes a five-sided relationship. While Rasmus views himself as independent, the contract with the club is described as an employment relationship. However, unlike the two previous cases, he has no strong affiliation with the club, and he would not contact them about issues related to the working environment.

Rasmus live-streams three to six hours at a time, five to six days a week. It is often mentally exhausting to live-stream because besides playing Counter-Strike and being energetic on camera, there is also a live chat where he corresponds with his followers.

It is stress. But [he sighs]... I feel it is improving. I feel ...I can control it. I feel that I have the freedom to take a week off away from the stream. If I need to do that, I can".

He tells about periods of stress, but places the responsibility to deal with it on himself. Additionally, if he takes leave or vacation, it is unpaid. This demonstrates the individualised conditions of the work and shows that Rasmus is aware of this personal responsibility.

Table 2
Young workers' Employment Relations in the Platform Economy and the responsibility for OSH.

Type of platform	Name of platform/ type of work	Employment relations and responsibility: reported by platform/agency	Employment relations: experienced by young worker	OSH responsibility: experienced by worker
Digital work platforms	Dogley	Self-employed	Platform as employer (job interview)	Grey zone: Both individual, customer and Dogley
	- Dog walking/sitting Hilfr - Cleaning	- No insurance Super Hilfr (employed) Freelance Hilfr (self-employed) - Insurance - Not covered in case of sickness absence	Platform as employer	Grey zone: Both individual, costumer, and Hilfr
Social media platforms	Chabber	Employed as temporary worker	Platform as employer	Grey zone: Unclear
	- Waiter - Cook - Bartender	- Responsibility delegated to customer		
Social media platforms	Influencer /YouTuber	Platforms (YouTube): self-employed Agency: unknown ⁴	Self-employed, but with an influencer agency who resembles an employer	Grey zone: Individual and agency responsibility
	Gamer	Twitch: self-employed Agency: unknown	Self-employed, but with a professional sports club who resembles an employer	Individual responsibility

⁴ We have not had access to the young influencers'/gamers' contracts, and for this reason we do not know the specifics of the contracts.

4.6. Summarising the findings

The analysis shows how some digital labour platforms take on employer responsibilities, while others offer employment for some workers. In the third example, the platform Chabber functions as an agency for hourly-waged temporary workers, and all workers are employed by the platform; however, the responsibilities are relegated to the customers who hire the workers for jobs. The different employment relationships are highlighted in Table 2 under 'Digital labour platforms' illustrate the disparities between different digital platforms and how they operate, which complicates a clear categorization of roles such as employer, employee, and self-employed.

The young workers who use social media platforms to earn money are more explicit about their position as independent workers, and the influence of the platforms is more subtle (Table 2). While embedded algorithms on YouTube and Twitch influence the visibility of the YouTubers and Gamers' channels and videos, they themselves control how they work, what content they produce, and which collaborations they accept. Instead it is the influencers'/gamers' affiliation with an agency or club that can be experienced as a traditional employment relationship for the workers.

The analysis shows a difference between social media platforms and digital labour platforms in relation to how the platforms influence and control the work. The influence and control of the platform on the work are more prominent with digital labour platforms: many of the digital labour platforms establish various conditions for the work e.g., when using algorithmic management systems (Laursen, Nielsen & Dyreborg 2021).

5. Discussion

A crucial characteristic of the platform economy is that the different work arrangements are mediated through digital platforms. This study found that young workers on digital platforms seem to have a number of OHS problems, and that the responsibilities for their OSH are unclear, and at the same time, these young workers have limited resources to deal with the risk they encounter in their work on digital platforms.

5.1. Protective gaps for young workers on digital platforms

This study suggested a categorization of digital platform work (Fig. 1), and the study focused on the two main groups, 'digital labour platforms' and 'social media platforms', including their subcategories. We found that digital labour platforms and social media platforms have a three-sided and a five-sided employment relationship, respectively. Thus the platform economy challenges the traditional dyadic relationship between employers and employees (Figs. 2 and 3).

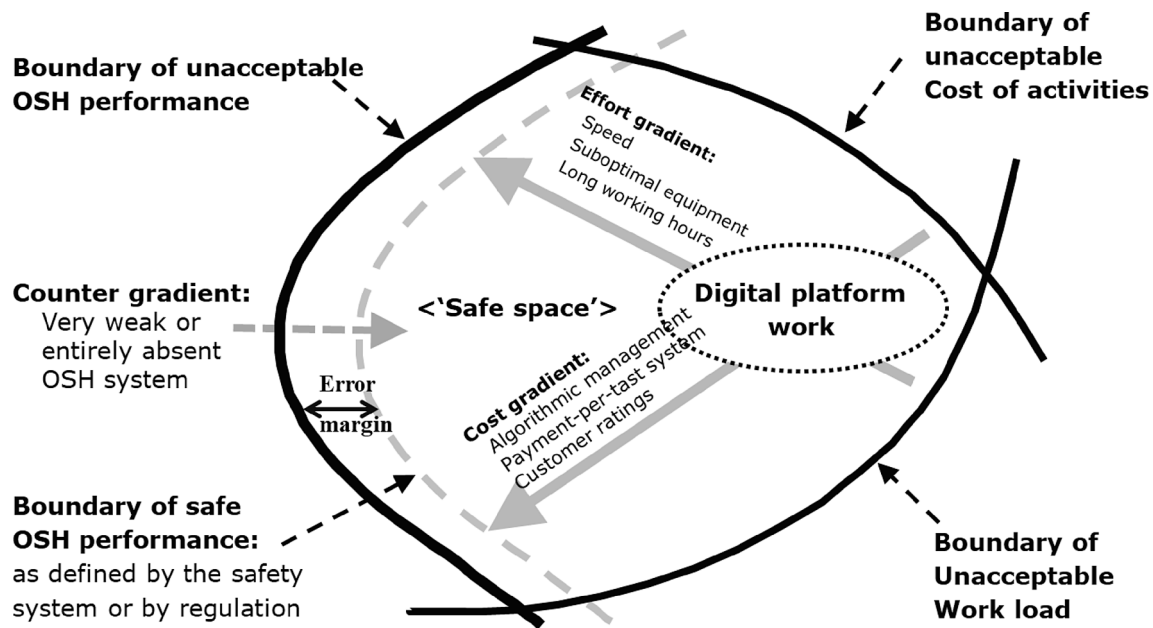


Fig. 4. Migration towards the boundary of unacceptable OSH performance in digital platform work. cost and efforts gradients push young workers activities towards the boundary of unacceptable OSH performance Adjust from Rasmussen's (1997) drift to danger'-model.

The study shows that for the young workers on digital platforms, it remains unclear to them who is taking responsibility for the OHS in their work, which entails that preventive measures are very weak or entirely absent. At the same time, these young workers seem to be exposed to risks at work that resembles temporary and 'non-standard' employment forms, which are characterized by an increased risk of accidents and other OHS problems, and weakened social conditions (Garben, 2017; Nielsen et al., 2019).

Consequently, young people working on digital platforms experience a 'protective gap' when it comes to OSH. These results support previous research in this field (Grimshaw et al., 2016; Nielsen & Laursen 2020; Rubery et al., 2018).

5.2. Understanding the basic mechanisms that challenge OSH on digital platforms

In his seminal paper on risk management in a dynamic society, Rasmussen (1997) proposed a descriptive dynamic safety model on migration towards the boundary of unacceptable safety performance (accidents). Rasmussen (1997) suggests that analyses are not focused on human errors and violations, but on the mechanisms generating behaviour in the actual, dynamic work context. Rasmussen's dynamic safety model (Fig. 4) describes a *safe space* or *safety envelope* for work activities within three boundaries, i.e., the boundary of economic failure, boundary of work overload and boundary of unacceptable safety performance that forms an envelope (Cook & Rasmussen, 2005; Rasmussen, 1997). Working within this envelope is considered a 'safe space', which means the risk of accidents or other OSH problems is within acceptable limits. However, the work activities are influenced by gradients that drive task performance away from the boundaries of work overload and economic failure and towards the boundary of unacceptable safety performance (accident or other OSH risks).

While Rasmussen's model was developed within the realms of high-risk industries and in a traditional organizational context (Waterson et al., 2017), we suggest, in the same vein as Nilsen et al. (2020), that the fundamental drivers or gradients that Rasmussen suggested, would apply to digital platform work as well.

We have operationalized each of these three gradients by using the results from this study. Young workers on the digital platforms

experience the cost gradient in terms of the algorithmic management system, the payment-per-task system and customer ratings, such as views/likes from followers, that is set up to encourage workers towards effective delivery of the service task, which may incentivize risky behaviours, and thereby increase the risk of accidents. These young workers are evaluated before, under and after they have finished a task, which means that there is a strong incentive structure putting pressure on task completion, and thus provides some basic mechanisms that increase the risk of the platform workers. These evaluation criteria are often unclear and ambiguous, and thus also create uncertainty in terms of when they have completed their work satisfactorily. The young workers in the present study experience the least efforts gradient, e.g., in terms of workloads related to speed, suboptimal equipment in cleaning jobs, long working hours, bullying, affective work in relation to customers, which leads to an increased risk in task completion. The same is seen for food deliveries, where these basic incentive mechanisms lead to particularly risky work situations, where young platform workers cycle quickly through traffic without a helmet with one hand on the handlebars and their phone in the other (Nielsen et al., 2020).

Thus, the young workers in the platform economy are pushed by the very same gradients as proposed by Rasmussen (1997). When a strong cost gradient and effort gradients drive the work activities, Rasmussen (1997) suggests that the result very likely will be a systematic migration toward the boundary of functionally unacceptable safety performance, which might compromise safety and accidents or other health outcomes may occur (Cook & Rasmussen, 2005; Rasmussen, 1997). This means, that strong gradients or forces are put on the young workers and thus driving them to the boundaries of unsafe OHS performance (Fig. 4). This is particularly problematic in digital platform work, as the counter gradient, in terms of an adequate OSH system and suitable safety prevention measures, are very weak or entirely absent.

The present study shows, that it is up to the young digital platform worker to make the trade-off between the effort gradient and the cost gradient set up by the platform, and then the counter gradient, i.e., the safety precautions, which the majority of the platforms in our study has transferred to the young workers. The platforms have also transferred the cost of prevention to the workers, i.e., safety equipment and instructions for doing work safely in relation to location-based platform work, as also noted by Nilsen (2020). As Hans (doing cleaning work via

the platform 'Hilfr') reported, suboptimal cleaning equipment and no training or instruction in correct work postures contributed to him having back problems in connection with the cleaning work. Should it happen, that a platform worker is injured at work, then only some of them are covered by an occupational injury insurance. Ditte, who takes jobs as a dog walker, was sure she was covered by an occupational injury insurance, but only the dog was covered by the insurance.

Similarly, workers on social media platforms have to deal with health and safety themselves, such as in cases of long working hours, neck pain, hate speech, or even online threats (Table 1).

Rasmussen's control theoretic approach emphasizes that efforts for improvement must then be directed toward the control of performance in interaction with the boundary of unacceptable safety performance, not on the control of errors (Cook & Rasmussen, 2005; Waterson et al., 2017). However, young workers on digital platforms have little or no influence on the control of the performance design, which to a very high degree is determined by the algorithmic management system. When the digital platform owners take little or no responsibility for the interactions between the performance system and the boundary of unacceptable safety performance, this is left to the young workers to avoid or compensate for the risks created by the work system.

5.3. Who takes care of the young workers' OSH on digital platforms?

When young workers fall outside the traditional dyadic employer-employee relationship, they are at the same time left with a very weak or entirely absent OSH system (the counter gradient in Rasmussen's model), and they end up in a 'protective gap' in enforcement of rights and OSH (Grimshaw et al., 2016). Furthermore, there is a lack of coherence between decision making regarding the content and the incentive structures underlying work performance and then the control of risk and safety related to the work.

This advances an important question: 'Who takes care of the young workers' OSH at digital platforms, thus the boundary of unacceptable performance? Is it the client, the platform, or the young worker themselves?

Neither national nor European legislation are clear about this protective gap. In connection with the legal definition of who is responsible for the platform workers' working environment, it is crucial to legally define to what extent a given platform has access to 'dispose' over the work, and to what extent 'instructions are given for the execution of the work' (Christensen, 2017p.21; Prassl & Risak, 2016). Is a digital labour platform to be legally defined as a neutral mediating marketplace based on technology, or should a digital labour platform rather be defined as a digitally based way of disposing of, instructing and controlling how and when work is performed? This remains an unresolved legal issue in Denmark and in the European Union. In Denmark most platform workers are considered and treated as self-employed (Garben, 2017), and work on this part of the Danish labour market is characterised by being highly individualised and deregulated (Nielsen et al., 2020). Nevertheless, in spring 2021 the OSH of the workers and drivers related to the online retail delivery service Nemlig.com attracted widespread media attention in Denmark (Pröchold, 2021). This happened parallel to the announcement of the EU Commission's 'first-stage consultation of European social partners on how to improve the working conditions for people working through digital labour platforms' (EU Commission, 2021). This has led the Danish government to announce, that more political attention should be directed towards the 'grey area' of 'platform work' and the working conditions of the platform workers, by proposing a 'presumption rule', which places the responsibility on employers to prove that their independent contractors are not "employees" (3F, 2021).

Regardless of such legislative discussions, we recommend that

strategies be developed to reach and protect workers on digital platforms. This is important, since non-standard employment, temporary work, and lack of introduction and training (aspects that all characterise the platform economy) increase the risk of OSH issues (Garben, 2017). It is especially important to recognise how young platform workers can be protected, since young workers as a group, are often more exposed to injuries (Dyrborg et al. 2019; European Agency for Safety and Health at Work, 2007; Garben, 2017). The platform economy's expected growth (Balaram et al., 2017; Manyika et al., 2016) underscores the importance of communicating knowledge about the complex employment relations associated with platform work - and its challenges - to governments, social partners and industry, and to young workers engaged in atypical employment via digital platforms. Our hope is that this paper can inform policymakers and actors within the occupational health and safety field about the protective gap and lack of enforcement of OSH in these types of work environment, along with the strong incentive structures young workers meet at the digital platforms.

6. Limitations

Even though, this study was based on a number of interviews, terms and conditions of the digital platforms, and exchanges of data and results with stakeholders in the field, the sample of young workers is to a high degree a convenience sampling, and will for this reason be biased. While the study contributes with new knowledge on the organisation of work and mechanisms at play that put young workers at risk at the digital platforms, the study cannot tell the prevalence of OHS problems among young people at digital platforms, and to what extent these risk are higher than among young people at workplaces with traditional employer-employee relationships. This is a challenge to collect unbiased data on this group of workers. Future research should focus on how to establish representative data on the OHS problems in this group of young workers, in order to better target those young workers at highest risk.

7. Conclusion

This study adds to the relatively sparse literature on OSH risks among young workers on digital platforms, and the significance of changed employment relations for the responsabilization of young workers for their OSH. For digital labour platforms, the employment relations are three-sided, and for social media platforms, the relations can even be five-sided. This study demonstrated that young workers are not aware of the formal rights and obligations that are relegated to them. The digital labour platforms often operate in a way that makes the young workers see them as their employers, as they control payment, instructions, provide support functions, provide clothes and equipment with the company logo on, and for some of them, their work is managed through algorithmic management systems, wherefrom detailed instructions and control emanate. This contributes to the impression among the young workers that the digital platforms also take care of OSH and cover them in case of an injury. Unfortunately, many of these young workers are working without any kind of insurance that would cover them in the event of an occupational injury. They are themselves responsible for the OSH related to their work via the platforms.

The responsabilization of OSH is about the transfer of responsibility for OSH from the digital platform or from the customers that receive the services, onto the young workers, who are then called on to resolve the OHS problems they encounter in their work. This is an insurmountable task to put on these young workers, since they have limited control over the planning and execution of tasks, and at the same time, they are under a strong control and incentive structure. When young platform workers operate in this grey zone, with complex relationships between workers,

employers and customers as well as blurred responsibilities for the working environment, it poses a risk to the health and safety of these young workers.

There are, therefore, reasons to question the transfer of responsibilities for OSH from the digital platforms to the young workers, and in particular, there is a need for making explicit the responsibility for OSH in these jobs. Here is clearly a protective gap that needs to be closed.

Credit authorship contribution statement

Mette Lykke Nielsen: Conceptualization, Methodology, Writing - Original draft preparation, Funding acquisition. **Cæcilie S. Laursen:** Conceptualization, Data curation, Formal analysis, Review & Editing. **Johnny Dyreborg:** Conceptualization, Methodology, Theoretical approach, Writing - Review & Editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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