Does space matter? An exploratory study of the effects of workplace settings on the needs for autonomy, competence, and relatedness

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Abstract

Every organisation will always need workplace settings to support their operations and so research on space planning presents various factors to consider when designing offices to maximise potential benefits from this resource. Taking into consideration self-determination theory (Deci & Ryan, 1985), this research explored the idea that organisations would benefit the most if workplace settings were designed in ways that support the satisfaction of psychological needs. A study was conducted aimed at finding evidence of whether workplace settings directly impact the satisfaction of the needs for autonomy, competence and relatedness, after controlling for factors already known to facilitate the satisfaction of psychological needs, namely, leadership style, occupational characteristics and individual factors.

Three hundred and seventy-four participants completed an online survey that gathered personal demographics, work-related demographics, their perception of their manager's leadership style (i.e., does their manager practice the engaging leadership style), the type of workplace setting they used, and how much they felt their need for autonomy, competence and relatedness were satisfied while working in their nominated workplace setting. There were no significant differences found between participants' reported levels of needs satisfaction from different workplace settings after controlling for the effects of leadership style, occupational characteristics (i.e., work-related demographics) and individual differences (i.e., personal demographics).

Noteworthy is that workplace settings were significantly associated with the satisfaction of autonomy even after controlling for the effects of leadership style and occupational characteristics and that the significant effect went away only after adding individual factors. Also, engaging leadership had a significant relationship with the satisfaction of the need for autonomy, competence and relatedness. Findings about engaging leadership confirm the relevance of leaders in creating a climate that satisfies psychological needs, which includes how leaders use workplace settings as a resource.

While there were no significant results between workplace settings and the satisfaction of psychological needs, findings suggest there may potentially be interaction effects between workplace settings, other work variables and individual differences. Thus, it is recommended that researchers use this study to inform future research that continues to explore the role workplace settings play within an organisation.

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgments), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Signed: _____ Andrea Cu

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Literature Review

Introduction

In 2020, the world was hit by a global pandemic that forced everyone to work from offices that many people would otherwise have not considered working from. With lockdown enforced, organisations had to learn how to continue operating with employees being anywhere they happen to be. Overnight, the concept of an office had to be redefined and the norm of having a clear distinction and distance between home and work was suddenly in question (Kant & Norman, 2021).

As we start to fully come out of the pandemic, we are hearing more and more of new and innovative workspace designs like co-working spaces (Foertsch & Voll, 2022), activity-based workplaces (Nickl, n.d.) – an office design that encourages staff to move around different spaces designed specifically for certain activities rather than having just one type of workspace (Gao et al., 2022), and remote or home offices (Andrews, 2021). However, remember that changing where we work was a reaction to a situation – a mitigation strategy against COVID-19. And yet the expectation today appears to be for employees to adapt to the new working norms, and vice versa, for management to adapt to employees' thirst to continue work from different settings (Andrews, 2021; Rawling, 2022).

Considering that the increase of remote working arrangements was not intentional or planned, perhaps it would be wise to pause and reflect on how exactly workplace settings affect individuals before we readily embrace and adopt new workplace designs and different kinds of workspaces; and perhaps there's no better time to do this than now.

Do workplace settings affect the way we interact with each other, the way we make decisions, and or our performance, and if so, why do workplace settings affect us the way it does? Some colleagues prefer to be at home because they claim to be more productive at home, while others are relieved to finally get back into the office. Why do some people prefer

one workplace setting while others prefer a different setting? Could it be that workplace settings affect us at a deeper psychological level? Research suggests that workplace settings could maybe create conditions that facilitate psychological mechanisms like feelings of autonomy (Mazmanian et al., 2013) and so this research aimed to understand the psychological impacts of workplace settings in hopes of enabling more informed decisions around different types of workplace settings, and also to help individuals understand why one might react or behave differently in different settings.

Workplace Settings

Early Workplace Settings

To start off, this paper examined the evolution of workplace settings, i.e., the location or space from where work is carried out from, beginning from what it was back in the 1500's. Back then, having a workstation meant having a desk, chair and shelves and these furniture were located wherever they could be placed (Chevez & Huppatz, 2017). Government agencies, traders and religious organisations would set-up workstations with the main purpose of having a place to write and then store documents and records (Chevez & Huppatz, 2017). By 1800's, workstations progressed from a desk, chair and shelves to different groups working in residential homes that were used as offices.

In 1856, a parliament committee proceeding about public offices documented evidence of the start of a movement to consolidate agencies that work together into physical locations near each other to achieve efficiency (Great Britain Parliament House of Commons, 1856). Furthermore, the committee ascertained that the layout and type of space allocated could be designed based on the type of work done, e.g., differentiating between work that needed to be done in a room or quiet space versus mechanical work that potentially needed supervision and so was more suitable in a big open plan space. It was expected that co-location and improving layouts would facilitate the flow of work and create transparency within and between teams. Bringing agencies closer together would also speed up

communication which could lead to saving not just time but also saving money. The main objectives of the proposals were to achieve efficiency and reduce costs.

The themes of efficiency and cost-effectiveness remained throughout the next hundred years and these objectives brought about an era focused on determining how optimum employee productivity could be achieved (Chevez & Huppatz, 2017; Taylor, 1998). During this period, organisations started to design office spaces into either rows of tables and chairs or into tiny cubicles side by side, which allowed organisations to house as many people as possible in a given space thus, reducing real estate costs while at the same time allowing a supervisor to easily see what everyone was doing (BOS, n.d.; Gripenstraw & Saini, 2020; Hickey, 2015; Schlosser, 2006).

Impact of Workplace Settings

Impact on Productivity. Productivity was and still is a key driver of organisations and so contemporary research continues to study the impact of workplace settings on work output. Greenaway et al. (2016) conducted an empirical study that compared worker performance in spaces that were (a) decorated with cues they identified with, (b) decorated with cues indicating a different team, and (c) undecorated. It was found that participants increased productivity when they were in a space they identified with. Participants in the experiment also increased productivity when they were in the rival team's space. This result was attributed to the competitive environment, which caused feelings of empowerment, and which ultimately led to better performance. Productivity was lowest in an undecorated space. Another example of the impact of workplace settings on output is the study of Gajendran et al. (2015). They surveyed employees who were allowed to telecommute, which was defined as employees allowed to either work from home, work remotely (i.e., work anywhere), or work from a satellite office. They found that telecommuters, compared to non-telecommuters, demonstrated higher task performance and that the time an employee spent working off-site was also positively related to task performance.

Impact on Personal Wellbeing. Despite a focus on efficiency and cost-effectiveness, there was a realisation that workplace settings affect individuals in ways beyond increasing productivity. For example, since the 1500's, it was recognised that the kind of (or lack of) workspace allocated to an individual signified status and power (Chevez & Huppatz, 2017; Great Britain Parliament House of Commons, 1856; Gripenstraw & Saini, 2020; Vischer, 2007b) and so a workstation came with subliminal messages. It was during the late 1900's that careful reflection and consideration of the impact of workplace settings on individuals really started proliferating.

Today, literature shows that apart from productivity, workplace settings also affect individuals' feelings of satisfaction and well-being. For example, when designing enclosed rooms, Marquardt et al. (2015) explained how using glass barriers could make individuals feel less protected than solid walls. Visual stimuli tend to dominate over other sensory stimuli and so having glass walls results in physiological and psychological reflexes getting activated even if an individual is exposed to just visual stimuli from outside the room. Individuals, therefore, get negatively affected by stressors outside the room even if the stressor is not directed at them and they are technically protected inside the room and are separate from the outside. The way spaces are allocated to individuals also affects feelings of well-being. Specifically, workers who do not have permanent workspaces (i.e., hot desking situation) feel unsatisfied with their ability to exert control over the workspace and therefore feel a decreased sense of security and privacy (Gao et al., 2022). Finally, where we work from could also affect feelings of well-being. For example, remote working was found to have a significant effect on well-being (Gajendran et al., 2015; Prasad & Mangipudi, 2021). Employees who work remotely feel more autonomous, feel that their managers have confidence in their skills and abilities which boosts their feelings of competence, and feel more dedicated to their job (Gajendran et al., 2015).

Impact on Social Interactions. Another aspect that workplace settings can affect is the social climate of an organisation – as in, workplace settings can affect social interactions and can be used to mold the social culture within an organisation. For example, the choice of

partitions is significant; a room with glass barriers creates a sense of space and openness, which is contrary to feeling enclosed in a room with solid walls (Marquardt et al., 2015). This illusion of openness could dampen the fight response when faced with a threatening or stressful situation inside the room, resulting in more collegial relationships and more willingness to engage in discourse (Marquardt et al., 2015).

Andrews (2021) and Kudyba (2020) support the idea that the way spaces are designed is important. They explained that if workspaces were designed in such a way that makes it inevitable for individuals to cross paths, it could create opportunities for serendipitous interactions and spontaneous collaboration, which are believed to lead to innovation. Regular face-to-face interactions also foster healthy competition, feelings of inclusion, and mentorship (Andrews, 2021; Kudyba, 2020). Similarly, in a survey of banking employees who transitioned into an activity-based workspace (Gao et al., 2022), it was found that increasing opportunities for chance encounters helps employees become more familiar with each other and develop deeper connections with each other, which then leads to higher collaboration and a sense of community or belongingness. These ideas would lead one to think that certain layouts, like shared spaces, co-working spaces, activity-based workspaces, or open-plan spaces, are more conducive to collaboration and for creating a sense of community among teams.

The above-mentioned findings support the thought that allowing employees to work remotely decreases interactions and therefore risks employees feeling isolated and disconnected from each other (Andrews, 2021; Kudyba, 2020). However, Gajendran et al. (2015) would argue otherwise. In their study of staff who were allowed to work off-site, they found that those given the opportunity to work off-site supported colleagues more, and that the amount of time an individual was allowed to spend off-site was positively associated with collegiality. Despite mixed findings on whether remote work increases or decreases social interactions among colleagues, one point of consideration that might help understand the impact of workplace settings on social interactions is proximity of individuals to each other.

Social-psychological research on personal space, which is the subjective self-determined space where an individual feels safe and comfortable (Hecht et al., 2019; Marquardt et al., 2015; Vagnoni et al., 2018; Welsch et al., 2019), sheds light on how proximity to each other affects social interactions. For example, Welsch et al. (2019) found evidence that discomfort towards another person rises when the other person comes within a distance less than the individual's subjective optimum personal space boundary; discomfort also increases when someone is too far from the individual's subjective optimum personal space boundary. Effects of respect versus violation of personal space extend to virtual environments as well. Hecht et al. (2019) conducted an experiment that compared preferred distances in-person and in a virtual environment and found similar results in both environments – the radius of optimum personal space was the same even in a virtual reality environment.

Also, proximity to each other is important because it affects exposure to auditory stimuli, which subsequently impacts social interactions. Specifically, Vagnoni et al. (2018) studied the impact of hearing an aggressive conversation. Participants were asked to listen to an aggressive conversation, then, without any visual stimuli, participants were asked to listen to approaching footsteps and indicate when they would like the footsteps to stop. Participants who were primed with an aggressive conversation asked the approaching footsteps to stop sooner than participants who were primed with a neutral conversation.

Lastly, construal-level theory of psychological distance (Trope & Liberman, 2010) is another theory that suggests that spatial distance, one aspect of psychological distance, impacts the way we think and behave, subsequently affecting social interactions. When an individual is spatially distant from a situation, they think and behave more abstractly. So, for example, when an individual is far from the office, which is where work normally takes place, their tendency would be to think about work tasks more abstractly and generally compared to if they were in the office. Their actions and words might then also be more abstract and general, which could then dictate the tone of their interactions with colleagues.

Figure 1 was created to broadly summarise and visually represent the impacts of workplace settings on individuals, which is that where we work or the type of office space we have affects productivity (Gajendran et al., 2015; Greenaway et al., 2016), well-being (Gajendran et al., 2015; Gao et al., 2022; Marquardt et al., 2015; Prasad & Mangipudi, 2021) and social interactions (Andrews, 2021; Gajendran et al., 2015; Gao et al., 2022; Hecht et al., 2019; Kudyba, 2020; Marquardt et al., 2015; Trope & Liberman, 2010; Vagnoni et al., 2018; Welsch et al., 2019).

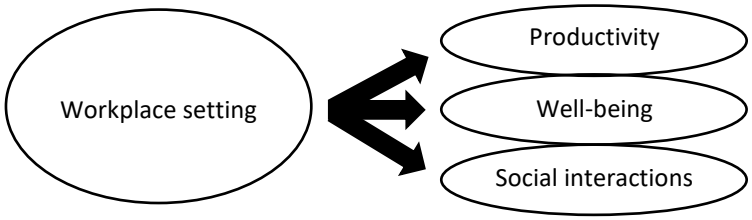
Considerations when Choosing a Workplace Setting

Taking into consideration how workplace settings impact productivity, well-being and social interactions, organisations have begun to reflect on what considerations are important to help choose or design an ideal workplace setting.

One consideration when choosing workplace settings is the availability of resources. For example, once upon a time, colleagues communicated with each other by physically sending hand-written correspondence (Great Britain Parliament House of Commons, 1856). This means of communication limited the distance between co-workers because otherwise, being too far apart meant it would take too long to send messages to each other. Eventually, technology developed and gave birth to inventions like the telephone, the computer, email, and the ever-increasing internet speed. These inventions paved the way for working in different ways (Chevez & Huppatz, 2017; Gripenstraw & Saini, 2020) and so affected

Figure 1

Summary and visual representation of the impacts of workplace settings



organisations' decisions around types of and locations of workplace settings. Another consideration is the environmental situation. For example, when COVID-19 broke out, organisations had to adapt to the requirement for people to isolate from each other. In the pandemic situation, the home suddenly had to become a workplace setting.

The above considerations focus on ways to increase employees' efficiency. This makes sense considering organisations constantly look for ways to increase their profitability. More profit could translate to finding ways to reduce real estate costs by designing workplace settings that increase productivity, sometimes at the expense of employee sentiments (BOS, n.d.; Gripenstraw & Saini, 2020; Hickey, 2015; Schlosser, 2006). But the above-mentioned considerations also demonstrate that organisations have since realised that it's not always about cutting costs. Sometimes, investing in employees' well-being and in appropriate resources to increase productivity is what leads to higher profitability. Investing in ways to encourage collaboration could also lead to innovation and healthy competition, which again ultimately leads to higher profitability (Andrews, 2021; Kudyba, 2020). Thus, research on the different impacts of workplace settings have led organisations to explore different kinds of office spaces to address different goals. In fact, it is now customary to see organisations employing several combinations and permutations of traditional enclosed rooms versus open spaces, assigned versus shared spaces, etc. (BOS, n.d.; Gao et al., 2022; Hickey, 2015; Nickl, n.d.; Schlosser, 2006), or using spaces creatively (e.g., Hickey (2015) talks about organisations creating large staircase landings that are used as meeting spaces), to ensure they cater for a vast array of requirements (e.g., quiet spaces, collaborative spaces, inspirational spaces, recreational and rejuvenating spaces, to name a few). Therefore, the question that that needs to be asked is, how would an organisation go about choosing and designing an ideal workplace setting?

Habitability Model. Vischer's habitability model (2007a, 2007b) presents three points for consideration when choosing or designing workplace settings: physical comfort, functional comfort and psychological comfort. Physical comfort relates to the suitability of the space to

be used. This involves meeting health and safety standards that ensure a space is fit for use and meets legal requirements. The second consideration, functional comfort, relates to how well the space enables an individual to carry out their tasks. Factors that would typically fall under functional comfort include proper lighting, ventilation and acoustics; having ergonomically suitable equipment; having the right types of spaces or rooms (e.g., having a room to have private conversations); or having suitably located spaces (e.g. putting teams that work closely with each other closer together). Lastly, psychological comfort encapsulates the ability of a workplace setting to satisfy an individual's needs such as the need for privacy and control, and the need for an individual to feel a sense of belongingness (a sense of territory) to the space they are using.

These three considerations, physical comfort, functional comfort, and psychological comfort are often addressed separately (Vischer, 2007a), as in for example, addressing a need for privacy has nothing to do with providing proper lighting. However, they should not be treated in isolation because the satisfaction of one type of comfort could be used to compensate for the lack of another comfort. To explain this further, consider an organisation that is offering an employee a choice of two desks: (1) a desk in an open plan space that is located in the part of a building that has big windows all around and (2) a desk in an enclosed individual office that is an internal space and so has no windows. For purposes of this example, let's assume the employee values both privacy and natural lighting. In this situation, even if the employee values two things, if they feel more strongly about having natural light than they do about having privacy, they might be willing to give up the privacy an enclosed individual office offers (give up psychological comfort) and choose a desk in the open plan space so that they get natural light (functional comfort) and still be satisfied overall with their workstation.

The more these three considerations are satisfied, the more individual productivity, team productivity and organisational productivity increase (Vischer, 2007a). The satisfaction of all these comforts also results in employee satisfaction and well-being (Vischer, 2007b; Vischer

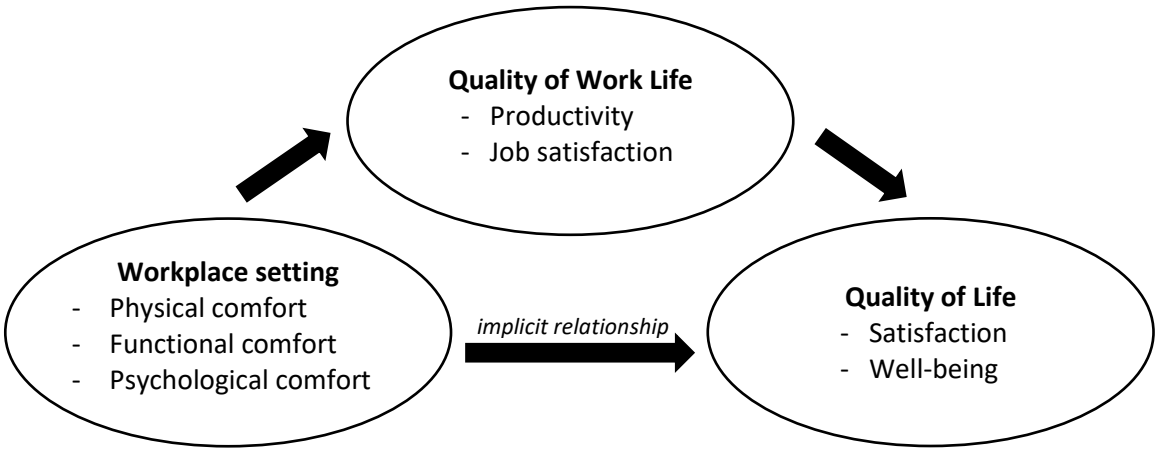
& Wifi, 2017). Figure 2 illustrates the role physical, functional and psychological comfort play within the relationship between workplace settings and productivity, satisfaction and well-being.

These three comforts are typically addressed hierarchically. Organisations tend to first address any legal requirements relating to building code (physical comfort) and would then look at functional comfort next, i.e. the ergonomics of the workspace and ensuring the space facilitates the flow of work. It typically is not until physical and functional comforts are met that psychological comfort is considered (Vischer, 2007a).

Physical comfort is about the minimum threshold that makes a space useable so it can be assumed that a building or space that is in operation meets minimum operational requirements and standards. Regarding functional comfort, we can see in the research

Figure 2

The effect of workplace design, in the context of the habitability model, on quality of life at work and on quality of life (Vischer, 2007a, 2007b; Vischer & Wifi, 2017)



Note. The original figure illustrates a linear relationship between workplace setting (called environmental quality in the original illustration) to quality of work life then to quality of life. The figure above was adapted to include (1) the habitability model as measures of workplace setting and (2) that "implicit in this argument is that there is a direct link between environmental design and quality of life" (p. 395). Adapted from "The Effect of Workplace Design on Quality of Life at Work," by J.C. Vischer and M. Wifi, 2017, *Handbook of Environmental Psychology and Quality of Life Research. International Handbooks of Quality-of-Life*, p.392 (https://doi.org/10.1007/978-3-319-31416-7_21). Copyright 2017 by Springer International Publishing.

presented earlier in this paper that organisations have long been cognisant of the need to address functional comfort. For example, Sir Charles Edward Trevelyan was already trying to improve functional comfort back in 1856 by bringing different agencies together in one area (Great Britain Parliament House of Commons, 1856). Marquardt et al. (2015) highlights the importance of the type of barrier used and the implications that using glass barriers might have on the functionality of a space. Literature on the impact of workplace settings on social interactions (Andrews, 2021; Gajendran et al., 2015; Gao et al., 2022; Great Britain Parliament House of Commons, 1856; Kudyba, 2020; Vagnoni et al., 2018; Welsch et al., 2019) demonstrate the thought organisations put towards ensuring the flow of work is optimised – functional comfort.

In addition to physical and functional comfort, we can also see strategies that are more person-centric, which emphasises psychological comfort. Specifically, the experiment of Greenaway et al. (2016) highlighted the importance of territoriality and being able to identify with a space; the findings of Gajendran et al. (2015), Gao et al. (2022) and Prasad & Mangipudi (2021) all reinforce employees' need to feel a sense of control over one's workspace; and the importance of considering the psychological impact of using glass barriers was discussed by Marquardt et al. (2015).

It is undeniable that all three considerations are already being taken into account. To get a better understanding of how workplace settings impact productivity, well-being and social interactions it seemed like a next logical step to determine whether motivation might play a part in how individuals react to the different comforts that workplace settings bring about.

Psychological Needs and Motivation

Overview of Motivation

Motivation can be viewed as something that triggers an individual's behaviours (Graduate Studies, 2019; Petri & Cofer, 2023). It gives insight into how much someone would be willing to participate in an activity, how much effort one would put towards the activity,

how much one would persist with an activity, or why they would even engage with an activity in the first place (Graduate Studies, 2019; Petri & Cofer, 2023). A motivator can be an antecedent – something that occurs before the action – or motivation can also come from a future event (Petri & Cofer, 2023). To illustrate, consider an individual who just got their own property and decided to put a small bee farm in the backyard. They grew up in a family who always had a bee farm and so their experiences growing up made them decide to do the same. In this example, their motivation to have their own bee farm could be said to have come from their past. This example can be contrasted to the same individual who then accepted a job as an investment banker. Their motivation for taking on the investment banking job is to attain a future goal, that is to get paid a salary that supports a comfortable lifestyle.

Regardless of whether the source of motivation comes before or after the behaviour, motivations are commonly viewed as being either intrinsic or extrinsic (Petri & Cofer, 2023). Intrinsic motivation refers a situation where the motivation comes from within the person such as internal feelings of happiness, enjoyment, and achievement, as when someone invests time and effort in a hobby (Petri & Cofer, 2023). Think back on the investment banker who earns a living in the finance industry and who is a beekeeper at home. Bee keeping is not something they do for a living. They do it because they enjoy doing it, they like learning about the it, they get a sense of satisfaction from engaging in this activity. On the other hand, if this investment banker/ beekeeper did not particularly love bee keeping but continued do it anyway because of the appreciation from their parents for continuing the family legacy and the recognition from the community for being a bee expert, then their motivation is not anymore coming from within. This external motivation is an example of the second type of motivation – extrinsic motivation.

Extrinsic motivation refers to motivation that comes from the desire to gain something external to the individual (Petri & Cofer, 2023). The investment banker/ beekeeper motivated to continue beekeeping because of the appreciation from his family and recognition from the community is extrinsically motivated because his source of motivation is his family and

community. If his family did not care whether he continued with bee keeping, and the community did not pay much attention to him either, he might have chosen a different hobby he enjoyed more than bee keeping. His job is another example of an extrinsically motivated activity. He is working as an investment banker for income such that if he were not getting paid, he would not be doing that job.

However, in these examples, it could be argued that there is a mix of different motivations. Let us use the extrinsic motivation scenario of the beekeeper, who is a beekeeper because of the appreciation and recognition from others. For the recognition and appreciation to be motivating, there must be an element of intrinsic motivation involved, as in, they must have a need for appreciation and recognition, or they must get a sense of satisfaction from knowing their actions are appreciated and recognised, which the actions of their family and community satisfy. If they did not care for appreciation and recognition, then even if their family and neighbours were showing appreciation and recognition, the actions of their family and neighbours would not have motivated them to engage in bee keeping. So, in this case, it could be said that bee keeping was motivated by an interplay of the appreciation and recognition from others (extrinsic), which was ultimately satisfying an internal need (intrinsic) to feel appreciated and recognised.

Now what would happen if our investment banker/ beekeeper valued both family support and community recognition, and the situation was such that the family frowned upon bee keeping but the community praised them for their bee keeping expertise; in this scenario what would they do regarding bee keeping? This introduces the idea that apart from the distinction between intrinsic and extrinsic motivation, the strength of motivators also plays a part in motivating action (Petri & Cofer, 2023).

In the simplified example above (simplified because there could be other factors involved), it can be seen that motivation could involve an array of motivating factors that either complement or contradict each other but that nonetheless contribute to a specific behaviour in each situation. Through the years, theories have been developed to identify

themes and trends that explain motivation. In particular, motivation theories sometimes describe different motivators as clusters of needs, and it is the satisfaction (or dissatisfaction) of these needs that propel individuals to take (or not take) action (Graduate Studies, 2019).

Examples of Motivation Theories

This next section presents some examples of motivation theories, starting with a well-known motivation theory, Maslow's Hierarchy of Needs, which says that individuals have five groups of needs, namely and in order of priority: physiological, safety, social/ love and belonging, self-esteem, and self-actualization. Maslow's theory suggests that individuals are motivated to meet physiological (survival) needs first, and that once basic survival needs are met, they would then seek to out ways to address safety needs next. Safety needs would include not just physical safety from harm but also things like job security. Once survival and safety are not anymore threatened, individuals would then be motivated to search for social satisfaction in the form of building strong bonds and relationships. Finally, the last two stages involve the need for achievement and acknowledgement that boost self-esteem, and then the need to achieve their sense of purpose as individual's seek self-actualisation.

Alderfer's ERG Theory modifies Maslow's theory and defines three instead of five needs, namely existence, relatedness, and growth, that motivates human behaviour. This theory is similar to Maslow's in that existence corresponds to physiological and safety needs, relatedness corresponds to social/ love and belonging and aspects of self-esteem like gaining respect and acceptance from others, and finally growth corresponds to aspects of self-esteem that relate to gaining self-confidence and self-actualisation (Graduate Studies, 2019).

Another theory, Herzberg's Two Factor Theory, places the concept of needs within the context of intrinsic and extrinsic motivation. The theory posits that individuals are motivated by hygiene factors, which are viewed to be mostly extrinsic motivators such as having a house and having a job. Someone would not get a house just for the fun of it, and more often than not, a person also would not get a job just for the fun of it – they would get a house to have a roof over their head and would get a job to earn money. Hygiene factors tend to correspond to

factors that satisfy physiological and safety (Maslow)/ existence (Alderfer) needs (Graduate Studies, 2019). The second factor of the Herzberg's Two-Factor Theory, motivation factors, are mostly intrinsic motivations such as the need to be loved or the need to feel competent. These can be thought of as factors that satisfy Maslow's needs for love and belonging, self-esteem, and self-actualisation, or that satisfy Alderfer's needs for relatedness and growth (Graduate Studies, 2019).

There are numerous other motivation theories but for the purposes of this research, recall at this point the habitability model (Vischer, 2007a, 2007b) that discusses the three comforts within workplace settings. The habitability model proposes that for a workplace setting to be effective, it needs to address physical comfort, functional comfort, and psychological comfort, and that these comforts are often addressed hierarchically (Vischer, 2007a). The motivation theories that have been discussed would confirm the approach proposed in the habitability model, which is to start with addressing physical and functional needs first, and then psychological needs. Physical comfort, which makes sure a workplace setting meets health and safety standards, is synonymous to addressing the need for safety and existence. Functional comfort refers to mechanisms within the workplace setting that allow individuals to accomplish tasks such as appropriate ventilation, lighting, and ergonomically suitable equipment, which would also seem to be part of safety needs. All the remaining needs, that of relatedness/ social/ love and belonging, and growth/ self-esteem/ self-actualisation, all would seem to be included under the last comfort, which is psychological comfort. It therefore makes sense according to Maslow's and Alderfer's theories, that psychological comfort is addressed after physical and functional comfort. However, there is another motivation theory, self-determination theory, that would suggest otherwise – self-determination theory highlights the importance of psychological needs.

Self-Determination Theory

Self-determination theory was developed by Edward L. Deci and Richard M. Ryan out of their desire to understand intrinsic motivation better (Gagné & Deci, 2014). Normally, when

an individual is intrinsically motivated, they feel joy and happiness; they partake in the activity simply because they like doing it. But in the research of Deci and Ryan throughout their career, they noticed that there are some activities that individuals do out of their own accord, without an external reward, but for some reason, contrary to what would be expected from intrinsically motivated activities, these activities do not seem to result in positive feelings (Gagné & Deci, 2014). That observation led them to speculate that extrinsic and intrinsic motivation might not be completely distinct categories and instead could possibly be a continuum such that something on the extrinsic motivation end of the continuum can move closer towards the intrinsic motivation end (Gagné & Deci, 2014). In other words, an activity that was extrinsically motivated can become more intrinsically motivated. This idea is what eventually gave birth to the sub-theories that make up self-determination theory (Gagné & Deci, 2014), two of which will be discussed next to explain the progression from extrinsic to intrinsic motivation and to outline what conditions cause motivations to change.

Basic Psychological Needs Sub-Theory. One postulation within self-determination theory is that humans have three basic psychological needs, namely the need for autonomy, competence, and relatedness (Deci et al., 2017; Rigby & Ryan, 2018; Ryan & Deci, 2000). Autonomy refers to feeling a sense of volition to partake in a task or on how tasks are accomplished (Rigby & Ryan, 2018). For example, an employee being micromanaged will feel less autonomous than someone who is given freedom to accomplish a project their own way. Individuals prefer to be able to make their own choices rather than to be controlled (Deci & Ryan, 1985). It is important to note that autonomy is not the same as being independent (Rigby & Ryan, 2018). For instance, an employee working on a project for the very first time might not feel ready to tackle the project on their own and so would rely on their manager to guide them through the steps. Even though they are not completing the task independently, they would still feel autonomous if they feel like they have the power to make decisions about the project.

Competence refers to the need to feel that one is capable of succeeding (Rigby & Ryan, 2018). An employee, who is assigned to a project, and who is given flexibility to accomplish the project their own way, but who feels the project is out of their league and so feels very lost and overwhelmed, might request to be assigned to a different project. Individuals will feel more motivated and comfortable to engage in tasks if they are confident in their abilities to succeed in the task (Rigby & Ryan, 2018). But what about tasks that an individual has not yet mastered? Self-determination theory would say that individuals are also motivated to *become* competent and so will be motivated by activities that are challenging yet still perceived to be doable (Deci & Ryan, 1985). In fact, it is expected that a task becomes unmotivating when it is perceived to be too easy (Deci & Ryan, 1985). For example, an employee might feel excited about a new project, but after doing the same project repeatedly, they might start to find that project boring and unmotivating. The need for competence therefore also involves a need to grow and develop ones existing knowledge and skillset (Rigby & Ryan, 2018).

The last of the three basic psychological needs is relatedness, which refers to the need to feel a sense of belongingness, to feel respected, and to feel valued (Rigby & Ryan, 2018). This might be thought of as a manifestation of humans being social beings. An employee who was assigned a project and who is thanked and recognised at the end of the project might be more willing to accept future projects than if they felt their accomplishments and contributions did not matter to their colleagues or to the organisation.

These three psychological needs are believed to be universal to humans and that the satisfaction of psychological needs directly link to overall well-being (Chen et al., 2015; Van den Broeck et al., 2010; van Hoof & De Pater, 2019). Van den Broeck et al. (2010) found a positive relationships between the satisfaction of needs and domain-specific satisfaction (e.g., job satisfaction and feelings of vigour while performing a particular activity) and overall general well-being (e.g., life satisfaction). Chen et al. (2015) surveyed teenagers and young adults from China, Belgium, USA and Peru, and found that the satisfaction of the needs for

autonomy, competence and relatedness led to well-being across all cultures, regardless of the value individuals attributed to each of the needs. van Hoof and De Pater (2019) surveyed 109 full-time interns across different industries and found that satisfying the need for autonomy and competence still led to better well-being even if participants did not think satisfying the need for autonomy and competence was relevant to their jobs.

Apart from the universality of psychological needs and its contribution to wellbeing, it is also believed that the satisfaction of the three psychological needs leads to the expression of an inherent self-determined drive to grow and be the best that one can be, which introduces a different way to look at intrinsic and extrinsic motivations that is presented in the organismic integration sub-theory within self-determination theory.

Organismic Integration Sub-Theory. To understand the proposition of the organismic integration theory, recall that when one is intrinsically motivated to do an activity, they participate in the activity because they want to do the activity for the sake of the activity (Petri & Cofer, 2023). They don't expect to get anything from it other than inner satisfaction. Recall also that when an action is extrinsically motivated, the act is done with the intention of gaining something externally (Petri & Cofer, 2023). The external gain could be something tangible like money/ a reward/ a certificate, or it could be something intangible like gaining friendship/ receiving praise. An issue with extrinsic motivation is the fact that the drive to engage is not from within. There is a reliance on the external motivator to drive behaviour such that when the external motivator ceases to exist, it is likely that the behaviour also stops. If we go back to our investment banker/ beekeeper character, income is the external motivator for being an investment banker (for the sake of simplicity, let us assume that income is their only motivator) such that the person will likely stop becoming an investment banker the moment they stop receiving a salary. To give another example in the context of the habitability model, consider an employee who dreams of having a corner office with lots of natural sunlight and a lovely sea view out their window, i.e., an office that provided functional comforts. Let us say this employee was motivated to accept a new role because with the new role came their

dream office; the office was their primary reason for accepting the new role. The danger with using this external factor to motivate the job acceptance is that once the office environment changes, the motivation to stay in the role is likely to go away – the employee might quit the role if it did not anymore come with a dream office.

The organismic integration theory suggests that extrinsic motivation can become internalised and integrated with one's own sense of self such that what once required an external motivator becomes an act that is self-determined or autonomously motivated – an act that an individual chooses to perform, willingly and wholeheartedly, even in the absence of any external motivation (Deci & Ryan, 1985; Deci et al., 2017; Ryan & Deci, 2000). According to Deci and Ryan (1985), this process of becoming autonomously motivated happens in four stages and begins with an extrinsically motivating activity, which is called the external regulation stage. An example of someone in this stage is our employee who accepted a job because of the promise of an attractive office room. At this point, there is reliance on the presence of the external factor, the office room, so that if you take away the office room, the interest in the job goes away.

The second stage, called introjection, happens when the association between the external factor and the act is understood and appreciated and so it becomes what the external factor represents or reinforces that now motivates the individual (Deci & Ryan, 1985). In our example, let us assume that the dream office was an office that was only allocated to senior staff members. Introjection would have happened if the employee started to think, *having a senior role is prestigious and good for career progression; senior roles come with good offices; the role that I accepted came with a good office and so must be a prestigious role; therefore the role is a good role to accept and stay in even if it did not anymore come with a good office.* In this stage, behaviour starts to persist even in the absence of the external motivator (Deci & Ryan, 1985).

A next progression is the identification stage where an individual starts to accept the societal value as their own, as in, something that an individual would do because it is valued by

society now becomes something an individual does because they personally value it (Deci & Ryan, 1985). So, in this stage, the employee that thinks a senior role is good for career progression would start to think, *I need to move on to a senior role because it will benefit me in the long run.* In the identification stage, while the individual now personally values engaging in an activity, they are still not yet fully self-determined because there is still an element of *need to*. The decision to engage is still somewhat controlled by an external push, i.e., would they still do it if they did not need to (Deci & Ryan, 1985)?

Integrated internalisation is the last stage that is characterised by an individual who is said to be self-determined or autonomously motivated because it is at this stage that, (1) the individual fully understands the need to do something, and therefore does not need any external motivation to engage in the behaviour, (2) the individual wants to engage in the behaviour, and (3) the individual feels free to choose when to engage in the behaviour (Deci & Ryan, 1985). If our hypothetical employee has reached the integrated internalisation stage, they would not care about the promise of a wonderful office, even if they do want a nice office. Should they be offered the role, they would accept the new role because they understand it is an important step in one's career development, because they want the role, and because they feel it is the right time to move on to such a role. In other words, an autonomously motivated individual would not feel pressured to move to a senior role because an offer was on the table; in fact, they would probably have been the one actively seeking out such a role in the first place and would not have been waiting passively to have been offered a senior role. This is the closest an extrinsically motivating situation would get to becoming intrinsically motivating (Deci & Ryan, 1985). Deci and Ryan (1985) would describe the integrated internalisation stage as a time where one's self is in agreement with the external world with as little conflict as possible, and this sense of unity is what allows an individual to fully thrive and be well.

Because of the progression that one needs to go through to become autonomously motivated, an individual needs support. The best way to support the development of

autonomous motivation is by providing an environment that facilitates autonomy, competence, and relatedness – the three basic psychological needs. Without feeling autonomous, an individual will not be able to move away from feeling controlled and therefore not reach self-determination. Satisfying the need for competence, which includes the need to be challenged and grow, is also essential to motivate an individual to progress through these stages towards achieving autonomous motivation. If the need for competence is not satisfied, i.e., if an individual feels they will not succeed, they will not feel motivated to pursue the task. Finally, satisfying the need for relatedness, i.e., reinforcing that actions will contribute to an individual's sense of belongingness, adds yet another stepping stone towards the journey of achieving autonomous motivation. This makes sense considering a behaviour would need to start off as a socially acceptable activity – something in the external regulation stage – before it can even develop into an autonomously motivated behaviour.

Benefits of Needs Satisfaction and Autonomous Motivation. Autonomous motivation is favourable because the harmony between one's internal self and the external environment leads to wellbeing (Deci & Ryan, 1985). Autonomous motivation is also more effective than extrinsic motivation at facilitating high performance (Deci & Ryan, 1985; Deci et al., 2017; Ryan & Deci, 2000). For one, autonomously motivated individuals internalise and accept the purpose of the task and do not need any coercion – they fully endorse and agree with performing the task, willingly and happily engage, and therefore it is completely their own decision to participate (Deci et al., 2017; Ryan & Deci, 2000; Steers et al., 2004; Van den Broeck et al., 2010; van Tuin et al., 2021). This removes pressure to continuously provide external motivators. Individuals who are autonomously motivated also get a higher sense of satisfaction and fulfilment from the activity compared to individuals who are extrinsically motivated (Deci et al., 2017; Gubler et al., 2016; Ostendoft et al., 2021; Ryan & Deci, 2000); and because the activity is satisfying and fulfilling, individuals are more motivated to perform well (Deci & Ryan, 1985; Deci et al., 2017; Ryan & Deci, 2000; Schaufeli, 2015). In addition, extrinsic motivation is less preferred over autonomous motivation because performance,

when extrinsically motivated, tends to be more measured and calculated, i.e., individuals put only enough effort deemed equivalent to the reward they would be receiving at the end of the task (Deci et al., 2017; Gubler et al., 2016; Ostendoft et al., 2021; Ryan & Deci, 2000). In fact, Herzberg's Two Factory Theory tells us that hygiene factors (generally extrinsic motivators) are often expected to be provided and so the presence of these factors do not contribute much to increasing motivation, but that dissatisfaction increases if these factors are not provided (Graduate Studies, 2019).

In summary, self-determination theory tells us that individuals are innately drawn towards activities that make them feel autonomous, competent, and connected. The satisfaction of psychological needs propels individuals towards a journey to develop a self-determined drive, autonomous motivation, to engage and perform, especially when it comes to activities that are typically extrinsically motivating. The satisfaction of needs and the development of autonomous motivation then gives individuals a greater sense of satisfaction and well-being.

Basic Self-Determination Theory Model in the Workplace

The purpose of introducing self-determination theory was to justify the argument that, in the context of the habitability model, there are benefits to emphasising psychological comforts over functional comforts. The hypothetical employee used as an example above was intentional to reference and juxtapose functional comfort (in the given example, an office that signifies a senior role) and psychological comforts (the satisfaction of psychological needs, which creates the ideal conditions to draw out autonomous motivation). However, the example presented is admittedly not an accurate representation of real life and was oversimplified merely to make a point. Thus, it is essential to review real empirical evidence that support the argument to put emphasis on psychological comforts/ needs.

Work itself is typically an extrinsically motivating activity, and money is typically the external motivator. According to the ideas in self-determination theory, it is advantageous that employees' psychological needs be met to make a typically extrinsically motivating activity

more autonomously motivating (Deci et al., 2017; Rigby & Ryan, 2018; Ryan & Deci, 2000). Autonomous motivation, as has been discussed, is beneficial considering it has been linked to overall well-being, and was found to lead to higher quality organisational performance (Deci & Ryan, 1985; Deci et al., 2017; Ryan & Deci, 2000), and therefore facilitating autonomous motivation among employees has organisational benefits. The research of Lin (2007) gives another concrete example of the benefits of satisfying psychological needs. Lin (2007) found that feeling competent about one's ability to use their own knowledge to solve work-related problems, and also being in an environment where the need for relatedness was met through interpersonal relationships, were both associated with positive attitudes and intentions towards knowledge sharing. Knowledge sharing is important in organisations because it ushers productivity and ensures business continuity (Lin, 2007). Lee and Brand (2005) also support the idea of encouraging the satisfaction of psychological needs. They discovered that employees who felt they had control or choice over their working environment got along better with their colleagues. This sense of group cohesiveness further led to job satisfaction, which then correlated positively with perceived job performance (Lee & Brand, 2005).

Examining research from the point of view of extrinsic motivations tells us that while extrinsic motivation could lead to immediate benefits – for example, an organisation will be able to attract talent by offering a competitive salary – it could be detrimental if the introduction of extrinsic motivation is not carefully thought out or implemented, or when the introduction of an extrinsic reward leads to feelings of inequity (Deci et al., 2017; Gubler et al., 2016). For example, Gubler et al. (2016) examined the effects of an attendance awards programme on the attendance of employees in industrial laundry plants. It was found that any improvements in attendance did not persist once the programme ended. Results also showed that employees who previously had good attendance records capitalised on the programme and became more calculated with their attendance such that while their tardiness did not change, their absences increased – a tactic which was employed to reap the most benefits from the programme. Most importantly, those who were less self-motivated showed even

lower levels of efficiency during the programme and retained the lower levels of efficiency even after the programme was terminated and even if the attendance awards programme related only to attendance and not efficiency. On a similar thread, Lin (2007) discovered that organisational rewards were not effective at encouraging knowledge sharing within the organisation and proposed this might be due to the transient benefits that external motivations brought. Deci et al. (2017) explained that extrinsic outcomes, like rewards, potentially make more salient the controlling functions of extrinsic motivation, making the behaviour even less intrinsically motivating. This is because the reward could create an impression of being bribed or coerced (Deci & Ryan, 1985), which undermines feelings of autonomy, thus causing employees to feel less enjoyment in the task itself (Deci et al., 2017).

Due to the benefits arising from the satisfaction of the three psychological needs, researchers have attempted to uncover what organisational factors facilitate the satisfaction of these needs. Self-determination theory applied in organisational settings suggests that there are three organisational factors that contribute to meeting our psychological needs and therefore enhance our inherent motivation to achieve optimal outcomes (Deci et al., 2017). Specifically, social contexts at work (Schaufeli, 2015; van Tuin et al., 2021), job-related characteristics (Dahling & Lauricella, 2017), and individual factors (Gajendran et al., 2015; McCusker, 2002; van Hoof & De Pater, 2019) are said to contribute to thwarting or facilitating the satisfaction of our psychological needs (Deci et al., 2017; Rigby & Ryan, 2018; Ryan & Deci, 2000).

Social contexts. The dominant social context variable that is said to contribute to the satisfaction of psychological needs is leadership style (Deci et al., 2017) as evidenced by studies that evaluated the impacts of leadership in the context of self-determination theory (Schaufeli, 2015; van Tuin et al., 2020; van Tuin et al., 2021). Researchers studied leaders who practiced what is called engaging leadership, which is a leadership style characterised by three things. First, an engaging leader delegated tasks and gave their employees responsibilities and freedom to make decisions (Schaufeli, 2015). This could be viewed as a means to give

employees autonomy over their work (van Tuin et al., 2020). Having responsibilities could also have provided opportunities to be challenged thereby satisfying the need for competence. A second characteristic of an engaging leader was that the leader made employees feel like they mattered and that they made important contributions to the organisations (Schaufeli, 2015). Employees' feelings of competence could be said to have been satisfied by the feedback that they were doing a good job, good enough that it was making a significant contribution (van Tuin et al., 2020). In addition, knowing that one's work contributed to the organisation could also have enhanced feelings of belongingness – it reinforced within an individual that they are an integral part of the team – therefore satisfying the need for relatedness. Finally, an engaging leader promoted collaboration among team members (Schaufeli, 2015). By helping colleagues build relationships with each other, this could be viewed as an environment conducive for an individual to satisfy their need for relatedness (van Tuin et al., 2020).

Over 1,000 Dutch employees were surveyed in Schaufeli's (2015) research and it was found that when an employee had an engaging leader, they showed better performance, higher commitment, and reduced feelings of stress and burnout. Similarly, an experiment that involved leaders undertaking an engaging leadership training programme resulted in reduced absenteeism among employees (van Tuin et al., 2020). These outcomes from having an engaging leader are the same outcomes that could be expected from someone whose psychological needs are met. For example, the high performance observed by Schaufeli (2015) could be a result of employees feeling competent – competent enough that they were willing to extend themselves and attempt challenging tasks therefore, not just meet expectations, but go over and beyond and be a high performer. More commitment from someone with an engaging leader (Schaufeli, 2015) could be a sign of employees feeling more connected to and having stronger bonds with their organisation, which signifies a satisfaction of the need for relatedness. In addition, lower absence rates from employees after a leader learned to practice engaging leadership (van Tuin et al., 2020), could be evidence of individuals becoming more autonomously motivated after their leader started using strategies that satisfied their

psychological needs. Finally, the reduced feelings of stress and burnout from employees with a manager who practices the engaging leadership style (Schaufeli, 2015) could be synonymous with feelings of well-being observed among individuals who are autonomously motivated. Thus, it can be inferred that an engaging leader facilitates the satisfaction of the need for autonomy, competence and relatedness, which subsequently fosters autonomous motivation. Leaders often dictate the way an organisation operates (Deci et al., 2017; Schaufeli, 2015; van Tuin et al., 2020; van Tuin et al., 2021) and so it makes sense that leadership would be a dominant social factor that contributes to the satisfaction of psychological needs.

Occupational characteristics. Occupational characteristics is the second factor that Deci et al. (2017) suggest contributes to the satisfaction of psychological needs. In particular, research suggests that jobs could be designed or structured so that they facilitate the satisfaction of the three psychological needs, with the belief that happy employees are more productive employees thus putting more emphasis on the well-being of individuals. This contrasts with the principles of scientific management that was made popular by Frederick W. Taylor (1998) in the late 1800's, otherwise known as the era of Taylorism.

Taylor (1998) believed that individuals will naturally work as little as possible rather than as hard as possible. He also believed that employees are a resource and so if organisations wanted to maximise profit, it is essential to scientifically measure the most efficient rate of work rather than rely on employees to decide how much (or how little) effort they put into a task. Through a series of experiments, he demonstrated an approach called scientific management that involved determining in detail the work that would be expected of an individual within each day, i.e., when to work and when to rest, and how much output was required from an individual within a specified timeframe. This led to an emphasis on task specialisation and a practice of doing only and exactly what one is told to do in order achieve optimum efficiency (Gagné & Panaccio, 2014). To achieve this practice, new roles within an organisation were created, such as one that determined the optimum rate of work and one that enforced the optimum rate of work (Taylor, 1998). Scientific management later became

known for focusing on reducing costs and increasing efficiency, probably too much that it had little regard for the well-being of employees (Gagné & Panaccio, 2014).

A literature review conducted by Gagné and Panaccio (2014) highlighted how breaking down jobs into microtasks, as in scientific management, resulted in employees doing repetitive tasks with little flexibility to deviate to maintain the integrity of the workflow (Gagné & Panaccio, 2014). This structure undermined feelings of autonomy. In addition, doing microtasks tended to make the bigger picture inaccessible (Gagné & Panaccio, 2014). Not knowing the value of one's contributions reduced feelings of relatedness making one feel unmotivated. Finally, being limited to just the same microtask also inhibited an individual from learning new things and challenging themselves, which frustrated rather than satisfied competence (Gagné & Panaccio, 2014). The era of Taylorism could be contrasted to the modern workplace where, rather than instructing employees to simply do what they have been told to do, organisations give employees means to contribute to the organisation's decision-making process – a strategy called participative management (Deci & Ryan, 1985). Participative management creates a situation where employees feel their voices are heard, which contributes to the satisfaction of their need for autonomy. Knowing that one's personal sentiments have been considered in the final decision also facilitates the development of integrated internalisation (Deci & Ryan, 1985).

Dahling and Lauricella (2017) provided another explanation for how occupational characteristics could facilitate the satisfaction of psychological needs. In their study, they pointed out that some tasks need to be performed individually or in isolation. Such a role made the job, by design, more conducive for satisfying autonomy (i.e., because the task is performed individually, the individual does not need to adapt to others and so has flexibility to do it their own way) but not conducive for satisfying relatedness (i.e., they are not given many opportunities to interact and build relationships with colleagues). Research also showed that jobs that by design supported autonomy and competence led to need satisfaction and ultimately led to more positive career attitudes (Dahling & Lauricella, 2017). Thus, because of

the potential of job designs to affect need satisfaction, Dahling and Lauricella (2017) recommended that organisations invest in ensuring job design meets employees' needs, especially since job design is more within the control of organisations, i.e., it is up to organisational leaders to decide how they want to structure the division of tasks and roles within their organisation. These findings, and the earlier ones mentioned, all reinforce that idea that occupational characteristics is a factor that contributes to the satisfaction of psychological needs and consequently to autonomous motivation (Deci et al., 2017).

Individual differences. Lastly, research tells us that while psychological needs are universal, individuals could have different preferences for what to them constitutes a satisfaction of psychological needs (Deci et al., 2017). For example, individuals have different goals and aspirations and therefore different priorities (Deci et al., 2017). If an individual's current priority is financial wellbeing, they would still seek autonomy-, competence-, and relatedness-satisfying activities but would more willingly reduce their expectations for psychological need satisfaction in exchange for higher monetary compensation. To concretise this example, consider an individual who just graduated and started working and so does not yet have much financial savings. They might be at a point in their career where they will accept any job, even a boring, monotonous, and repetitive job that does not satisfy autonomy or competence, as long as they can secure a job. This could be contrasted to an individual who is at the prime of their career, who had been working for many years and who is already financially stable. This second individual would have very different priorities from the fresh graduate and might be less willing to compromise on the satisfaction of their psychological needs in exchange for monetary compensation since financial well-being is not anymore a priority. This does not mean though that for the fresh graduate, extrinsic motivation over intrinsic motivation is better. A more fulfilling job that satisfies autonomy, competence and relatedness might still ultimately make the fresh graduate happier and more autonomously motivated (Deci et al., 2017) such that even though they did choose the boring job, they would feel unmotivated to excel in that job, and that if they had a choice, they would still prefer a

role that made them feel autonomous, competent and related – it just so happens that they are more willing to give the boring job a chance due to their circumstances.

van Hoof and De Pater (2019) showed another way in which individual differences affect the satisfaction of psychological needs among individuals. In their research, they discovered that when employees did not value the need for relatedness, there were no significant benefits seen following the satisfaction of the need for relatedness at work. For example, an open plan office is often used by organisations to facilitate collaboration. It is believed that the layout of an open plan workspace naturally increases communication and chance encounters (Andrews, 2021; Gao et al., 2022; Great Britain Parliament House of Commons, 1856; Kudyba, 2020). Regular communication creates opportunities for colleagues to build relationships with each other thus, potentially contributing to the satisfaction of the need for relatedness. However, regardless of the intention to provide an environment that satisfies the need for relatedness, research showed that an individual's personality affected their perception of the workspace (McCusker, 2002). In particular, a significant positive relationship was found between individuals' scores on extraversion and their satisfaction with an open plan office, such that an individual would feel their need for relatedness satisfied if they scored high on extraversion, but would not feel their need satisfied if they scored low on extraversion (McCusker, 2002). In fact, an individual who scored low on extraversion might even perceive an open plan workspace as an environment that causes too much anxiety and therefore ill-being. Similarly, Gajendran et al. (2015) found that whether a need is perceived as satisfied or not would depend on an individual's perception of the situation. In their research, they discovered that an individual's satisfaction of their need for autonomy would be satisfied by being allowed to work remotely only if the individual perceived remote work as an exclusive benefit.

Deci et al. (2017) captures the dynamic of the different factors affecting the satisfaction of needs in their "basic self-determination theory model in the workplace" (p.23),

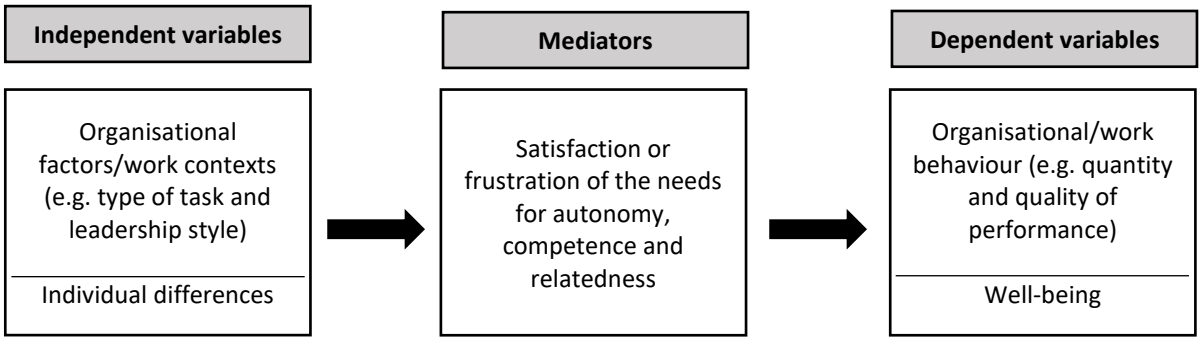
which is illustrated in Figure 3 and which states that organisational factors/ work contexts, such as the type of tasks individuals do at work and the leadership style of management, and also individual differences surrounding work goals and aspirations, all contribute to the satisfaction or frustration of our basic psychological needs (e.g., our needs for autonomy, competence and relatedness). The satisfaction of our basic psychological needs acts as a mediator between workplace contexts and individual differences, and organisational/ work behaviours (e.g., the quality and quantity of employee performance) as well as employee well-being.

Workplace Settings and Psychological Needs

After having presented all the information thus far, this paper is now in a position to form the theoretical framework of this research: it has been discussed that workplace settings affect individuals' productivity, well-being and social interactions, and that the habitability model provides a summary of factors about a workplace setting that affects behaviour. In particular, psychological comfort is one consideration when designing or choosing workplace settings, which gave reason to speculate that where we work affects us at a deeper psychological level. And yet organisations often focus on meeting physical and functional

Figure 3

Basic self-determination theory model in the workplace



Note. This figure presents aspects of the basic self-determination theory model in the workplace relevant to this research. Adapted from "Self-determination theory in work organisations: The state of a science," by E. L. Deci, A. H. Olafsen and R. M. Ryan, 2017, *The Annual Review of Organizational Psychology and Organizational Behavior, 4*, p. 23 (https://doi.org/10.1146/annurev-orgpsych-032516-113108).

comforts first before psychological comfort. Should organisations perhaps look more into the effects of psychological comfort to enable organisations and individuals to reap the benefits from workplace settings? This question led to a deeper look into motivation theories.

Motivation has been studied extensively and one theory in particular that has been widely applied to organisational settings is self-determination theory. This theory provided good reasons for why organisations would benefit from emphasising psychological needs. Specifically, self-determination theory tell us that humans have three basic psychological needs, that when satisfied, leads to wellbeing and also to the development of autonomous motivation to grow and thrive. Because of this, researchers have studied self-determination theory in the context of organisations and have gained knowledge around how the satisfaction of psychological needs is affected by social contexts (i.e., who we work with), occupational characteristics (i.e., what we do at work), and individual differences (i.e., our individual selves that we bring to the workplace). However, the contributions of workplace settings (i.e., where we work from) on psychological needs do not seem to be part of the equation. But do workplace settings contribute to the satisfaction of psychological needs?

In recent years, the topic of workplace settings has gained attention, and more importantly, where we work has changed after the Covid-19 pandemic. After having examined research on workplace settings and on self-determination theory, this paper proposed that while a link appears to have been established between workplace settings and positive organisational outcomes such as higher productivity and well-being, the role of psychological mechanisms is unclear. Also, there appears to be a gap in understanding the role workplace settings has, alongside social contexts, occupational characteristics and individual differences in facilitating the satisfaction of psychological needs. These are the gaps that this research hoped to help address.

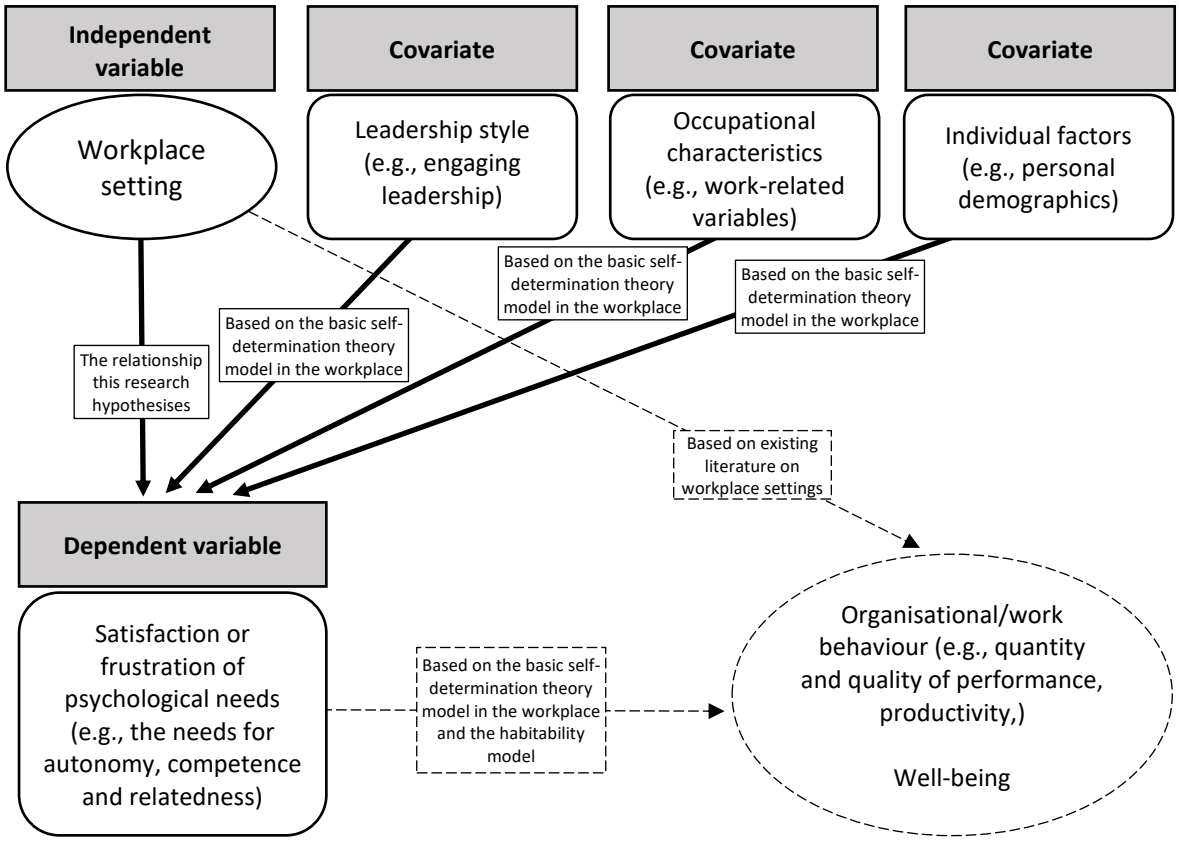
This Research

The conceptual model of this research drew from Vischer's (2007a, 2007b) habitability model, which indicates that workplace settings can be designed so that they satisfy

psychological comfort, which consequently leads to higher productivity, satisfaction and well-being (see Figure 4). The habitability model reframed through a self-determination theory lens led to the definition of psychological comfort as the satisfaction of psychological needs and thus the conceptual model of this research was illustrated to reflect that workplace settings can be designed so that they satisfy the satisfaction of autonomy, competence and relatedness, consequently leading to higher productivity, satisfaction and well-being. The basic self-determination theory in the workplace point to leadership style, occupational

Figure 4

Conceptual research model of the effect of workplace settings on the needs for autonomy, competence and relatedness while controlling for leadership style, occupational characteristics and individual factors



Note. Past research findings have established the impact of workplace settings (IV) and satisfaction of needs (DV) on organisational/work behaviour and well-being (Greenaway et al., 2016; Hecht et al., 2019; Kant & Norman, 2021; Marquardt et al., 2015; Rigby & Ryan, 2018; Ryan & Deci, 2000; Sailer et al., 2021; Trope & Liberman, 2010; Vagnoni et al., 2018; Vischer, 2007a, 2007b; Welsch et al., 2019). This relationship depicted in broken lines was not measured in this research; the present research aimed to investigate the relationship between workplace settings (IV) and satisfaction of psychological needs (DV).

characteristics, and individual factors as contributing factors to the satisfaction of psychological needs. Thus, the model of this study included controlling for the effects of leadership style, occupational characteristics, and individual factors in order to isolate whether workplace settings affect the satisfaction of psychological needs.

A direct link between workplace settings and the satisfaction of psychological needs has not yet been established to the best of my knowledge. The current study aimed to empirically examine whether this link between physical workplace settings and the satisfaction of the needs for autonomy, competence and relatedness exists. The three psychological needs were measured as separate constructs, as opposed to examining the overall need satisfaction score, because different workplace settings possibly cater for the three needs differently or even contradictorily (Andrews, 2021; Dahling & Lauricella, 2017; Gajendran et al., 2015; Gao et al., 2022; Kudyba, 2020). Hence, the research questions were as follows:

R1: How do workplace settings affect the need for autonomy while controlling for leadership style, occupational characteristics, and individual factors?

R2: How do workplace settings affect the need for competence while controlling for leadership style, occupational characteristics, and individual factors?

R3: How do workplace settings affect the need for relatedness while controlling for leadership style, occupational characteristics, and individual factors?

It was hypothesised that:

H1: Employees working remotely will show the highest satisfaction of the need for (H1a) autonomy and (H1b) competence (Gajendran et al., 2015);

H2: Workplace settings that are assigned to individuals (not shared) will satisfy the need for autonomy more than workplace settings that are shared (Gajendran et al., 2015);

H3: Employees in shared workplace settings space will report the lowest satisfaction of the need for autonomy (Gao et al., 2022);

H4: Employees in an open-plan space will show the highest satisfaction of the need for relatedness (Andrews, 2021; Gao et al., 2022; Kudyba, 2020).

Finally, given that leadership style, occupational characteristics, and individual factors are already known to influence the satisfaction of the three psychological needs (Deci et al., 2017), and given that workplace settings can contribute to satisfying psychological needs through the provision of psychological comforts (Vischer, 2007a; Vischer, 2007b), it was further hypothesised that:

H5: Workplace settings will be significantly associated with the satisfaction of the need for (H5a) autonomy, (H5b) competence and (H5c) relatedness, even after controlling for leadership style, occupational characteristics and/or individual factors.

By answering the research question and testing these hypotheses, this research hoped to contribute (a) to the basic self-determination theory in the workplace by adding workplace settings as an antecedent to the satisfaction of psychological needs and also (b) to the habitability model by questioning the hierarchical order of physical, functional and psychological comfort.

Method

Design

This study used a one-way between-subjects design, to measure and analyse the effect of five different workplace settings on the satisfaction of three psychological needs, autonomy, competence and relatedness, while controlling for variables associated with leadership style, occupational characteristics and individual factors (Deci et al., 2017; Rigby & Ryan, 2018; Schaufeli, 2015).

Participants

A minimum of 303 participants was required based on an *a priori* sample size calculation for one-way ANCOVA using G*Power 3.1.9.2 (Faul et al., 2007) for this study to have a 95% power to detect a medium effect size of .25 with a significance level of $\alpha = .05$. Participants had to be at least 16 years old and employed doing an office or desk job either part or all of the time during the course of their work to be eligible to participate in this study. A total of 374 participants were included in the study.

Materials

Workplace Setting

Workplace settings was operationalised as the location and/or type of workplace employees worked from the most during the course of their work. Participants chose from one of five types of workplace settings derived from Weziak-Białowolska et al. (2018) (see Appendix A). The most commonly reported workplace setting was a remote office (*n* = 98, 26%) followed by an enclosed office shared with others (*n* = 90, 24%). Twenty percent of the respondents (*n* = 76) worked from a shared open plan space (e.g., hot desk space in an open plan) while 16% (*n* = 59) had a workstation or cubicle in an open plan space that was assigned only to themselves. The least popular workplace setting was an enclosed single-person office assigned only to one person (*n* = 51, 14%).

Satisfaction of Needs

The satisfaction of the needs for autonomy, competence and relatedness was measured using the work-related basic need satisfaction scale (W-BNS) by Van den Broeck et al. (2010). This version of the need satisfaction scale was chosen because it measures the satisfaction of the three basic psychological needs specifically within an organisational setting, while mitigating the impact of impression management from self-reporting, which is the tendency to choose socially desirable responses. The wording of the scale was modified slightly (e.g., the statement "I feel like I can be myself at my job" was modified to "While working from the (workplace setting), I feel like I can be myself") to suit this study without changing the meaning of each statement (see Appendix B).

The W-BNS has a total of 18 items separated evenly into three subscales that measured each of the psychological needs, namely, participants' feelings of autonomy (e.g., "I feel like I can be myself"), participants' feelings of competence (e.g., "I really master my tasks at my job"), and participants' feelings of relatedness (e.g., "I feel part of a group"). Participants responded to each statement on a 5-point scale ranging from totally agree to totally disagree (from left to right as it was presented in the survey). The autonomy factor had three reverse-coded items; the competence factor had two reverse-coded items, and the relatedness factor had three-reverse coded items. The average of the six items relating to each factor was calculated to create scores ranging from 1 to 5 that corresponded to the satisfaction of autonomy, competence and relatedness and where a higher score meant higher levels of satisfaction. The Cronbach's alpha coefficients of the factors in this scale for this study were .72 for autonomy, .82 for competence, and .78 for relatedness suggesting good internal reliability.

Engaging Leadership

The concept of engaging leadership was used as the operational definition for leadership style and was measured using the engaging leadership scale developed by Schaufeli (2015). The scale (see Appendix C) has nine items, separated evenly into three subscales –

strengthening, connecting, and empowering – that relate to leadership practices. The first three items measured the concept of strengthening, which measured how much an employee felt they were being supported to grow and develop. One statement in this subscale was “my manager encourages team members to develop their talents as much as possible.” The connecting subscale measured employees’ perception of how well a manager was able to encourage collegial relationships within the team. One of the items in this subscale was “my manager encourages collaboration among team members.” Finally, the last three items measured the concept of empowering, which referred to how much an employee felt they were allowed to make decisions. An example of an item in this subscale asked participants to rate how much “my manager gives team members enough freedom and responsibility to complete their tasks.” All three aspects collectively form the leadership style known as engaging leadership.

Participants were asked to rate how much they felt each statement in the scale described their manager on a 5-point scale from completely agree to completely disagree (from left to right as it was presented in the survey) none of which were reverse-coded. Participant ratings were averaged to form a composite engaging leadership score with a higher score reflecting a higher level of engaging leadership (Rahmadani & Schaufeli, 2020; Schaufeli, 2015). The Cronbach’s alpha coefficient of this scale in this study was .90 suggesting excellent internal consistency.

Occupational Characteristics

Occupational characteristics in this study was operationalised as the participant’s professional level or job position (i.e., “Labourer/ Tradespeople,” “Administrator/ Coordinator/ Office Staff,” “Technical Staff/ Professional Occupation,” “Manager,” “Senior Leadership,” “Other”), employment type (i.e., “Permanent full time,” “Permanent part-time,” “Fixed-term full time,” “Fixed-term part-time,” “Hourly paid”), tenure, work experience and industry. Tenure was defined as the length of time an employee has been working with their current employer, while experience was defined as the total years of working experience which

includes current and past employment. Industry choices were based on the standard industry classifications listed in https://www.businessdescription.co.nz/, which is used by New Zealand's Accident Compensation Corporation (ACC), Inland Revenue, and Statistics New Zealand.

Individual Factors

Personal demographics such as age, gender and highest educational attainment were used as the operational definition for individual factors. Age was determined based on participants' reported birth year. Participants reported their gender as one of the following: "Male," "Female," "Gender diverse" and "Prefer not to say." Highest educational attainment was prompted with the question "What is your highest educational attainment?" and the following choices: "Primary/ Secondary," "Diploma," "Bachelor's degree," "Master's degree" and "Doctoral degree."

Procedure

The AUT Ethics Committee approved participant recruitment (see Appendix D), which was conducted between October 2022 to January 2023 using snowball convenience sampling. The researcher posted initial information about the study, which included a link to the survey, on her personal Facebook, Instagram and LinkedIn pages, where friends, family and colleagues were encouraged to further share the post. The same information and link were also posted on online community groups such as Facebook groups (e.g. Survey Sharing, Survey Circle, Survey Exchange, Research Survey Exchange Group, Student Survey Swap, Survey 4 Survey, Research/Survey, Student Survey Exchange) and SurveyCircle. Finally, print flyers with a link and QR code to the survey were posted in public places like libraries and pools, around the campus of Auckland University of Technology, and in cafes in the community.

The link and QR code led to a Qualtrics survey, which was composed of four parts. First, participants were given the opportunity to read the participant information sheet (see Appendix E) before consenting to the study. The second part of the survey collected participant demographics such as age, gender, educational attainment, professional level or

job position, tenure, work experience, employment type and industry. Third, the level of engaging leadership of the participant's immediate manager was measured. Statements in the Engaging Leadership Scale were randomly presented. Finally, participants nominated the workplace setting they used the most, after which, the satisfaction of their needs for autonomy, competence and relatedness in their nominated workplace setting were measured using the W-BNS. Statements in the W-BNS were also randomly presented.

Upon completion of the survey, as compensation for participation, participants could opt to participate in a raffle draw to win one out of two $100 e-gift cards, one out of three $50 e-gift cards, or one out of twenty $25 e-gift cards. Participants who opted to participate in the raffle draw were redirected to a separate survey that collected contact details for the draw. Contact details were not associated with data in the survey in any way to maintain the anonymity of responses. Twenty-five raffle winners were drawn using an online random picker tool (https://www.gigacalculator.com/randomizers/random-picker.php). From the pool of winners, the same tool was used to determine which e-gift card denomination they won. Winners of the raffle draw were advised via email and the e-gift card was emailed to the winners.

Analyses

An initial analysis was conducted to exclude irregularities and clean the data. Initial analyses also included descriptive and correlational analyses to identify trends in the data. In addition, preliminary inferential analyses using a between-subjects one-way analysis of variance (ANOVA) were conducted to detect statistically significant differences in participants' satisfaction of the need for autonomy, competence and relatedness in different workplace settings. Tukey HSD and Bonferroni post hoc analyses were carried out, where relevant, to gain further insight on the results of the one-way ANOVAs.

The main analysis for this research was a between-subjects one-way analysis of covariance (ANCOVA) to see the effects of the workplace setting on the satisfaction of the needs for autonomy, competence and relatedness, while controlling for the effects of

leadership style (i.e., level of engaging leadership), occupational characteristics (i.e., employment type, industry, position/ professional level) and individual factors (i.e., age, gender, highest educational attainment, tenure, years of working experience). An alternative to ANCOVA could have been hierarchical regression. Conducting hierarchical regression analysis would have involved dummy coding variables, which was opted against in this research.

Results

Preliminary Analysis

Exclusion

The raw data consisted of 1022 responses received through Qualtrics. It was noticed that on three separate days, more than a hundred responses were received within a span of a few hours each day, totalling 601. On each of the days in question, responses were received in very quick succession, within seconds apart, with chunks of responses being identical to each other. This led to the suspicion that these responses were not from human responses that reflect individual views, but rather were generated automatically, such as by a bot, and so were excluded from the study. Of the remaining responses, a further 43 responses, from participants who were less than 16 years old or who were not employed doing an office/desk job at the time of the survey, were excluded leaving 378 responses.

Among the remaining 378 respondents that completed the survey until the end, two participants completed the survey, but because they specified “PhD student” in job position they were considered unemployed and therefore their responses were excluded. In addition, one participant declared themselves to be 118 years old, while another reported themselves to be a 65 year-old participant who had been working as a ‘jack of all trades’ for 54 years. These were believed to be unrealistic or erroneous data and so both responses were also removed.

Data Preparation

The next step was to prepare the raw data for analysis. First, among the 374 remaining responses, 15 respondents reported more years in their current job, which was prompted with the question, “Specify how many years you have been in your current role,” than their total years working, which was prompted with the question, “Specify in years how much work experience you have (your current role and your previous work experiences).” The terms “tenure” and “experience” could be used differently in different contexts. It was assumed that participants misunderstood the terminologies, hence for these participants, data were

retained but their answers to “tenure” were swapped with data entered for “experience”. One participant entered 610 years for tenure and then ten years for experience. It seemed likely that the intention was to report six tenure years and a total of ten years of work experience and so the data was corrected accordingly. Second, 19 responses of “Other” to the question, “What best describes your current position/ professional level?” and 31 responses of “Other” to the question, “What industry do you work in?” were re-evaluated and recoded to the appropriate position/ professional level and industry where relevant. Finally, scores for engaging leadership, and satisfaction of the needs for autonomy, competence and relatedness satisfaction were calculated after reverse-coded items were re-coded.

After the initial exclusions, re-coding of variables and calculation of scores for the different scales, a frequency analysis of the remaining data was done to check that the groups within each variable had an acceptable number of participants. Within the variable gender, very few participants were in the groups “Gender diverse” (*n* = 6) and “Prefer not to say” (*n* = 2), and within the professional level variable, only one participant was in the “Other” group. Having too few participants within a group could lead to non-meaningful results and so one approach this research could have taken was to exclude these groups from further analyses. However, this research does not aim to break down gender groups or professional level in the analyses. Thus, this research took the more conservative approach of retaining all groups within the variables gender and professional level. Similar to gender and professional level, within the industry variable, there were also small groups. For example, only two participants worked in the mining industry and only three participants worked in the wholesale trade industry. The industries with small sample sizes were combined and recoded (e.g., “mining” was combined with “agriculture, forestry and fishing”; “wholesale trade” was combined with “transport, postal and warehousing”) to have a more even distribution of participants across different industry groups. A total of 374 responses remained and were included in the main analyses.

Testing Assumptions

After preparing the data, the next step of the preliminary analyses involved testing to see whether the assumptions of a one-way analysis of covariance were met. Testing assumptions ascertained the appropriateness of using this analysis. A visual inspection of the histogram and Q-Q plot showed a fairly normal distribution of the variables. Outliers were truncated to be within three standard deviations to satisfy the assumption of normality. In particular, the following variables had values truncated to be within three standard deviations from the mean: (1) four values within the variable age, (2) seven values within in variable tenure, (3) seven values within the variable experience, (4) six values within the variable engaging leadership, (5) one value within the variable for the satisfaction of autonomy, (6) two values within the variable for the satisfaction of competence, and (7) one value within the variable for the satisfaction of relatedness.

Correlational analyses conducted to test the independence of observations revealed no unexpected correlations. The Levene's Test of Equality of Error Variances for autonomy (p = .10), competence (p = .74) and relatedness (p = .76) were non-significant, suggesting that the assumption of equality of variances was met. Equal variances across the sample would suggest that any variances found could potentially be attributed to the intervention variable. Lastly, analyses were conducted to confirm whether the assumption of homogeneity of regression slopes was satisfied. This assumption checked that the relationship of the dependent variable and covariates were the same in each treatment group (workplace setting) and that there was no interaction between the covariates and the treatment that could affect the outcomes. The assumption of homogeneity of regression slopes were satisfied for autonomy (p = .54) and relatedness (p = .92), and marginally satisfied for competence (p = .04).

Participant Demographics

A total of 374 participants were included in the study after all the exclusions and re-coding. Participants' ages ranged from 16 to 65 years old (M = 34.84, SD = 10.08). Slightly more than half of the participants were male (51%) and 47% were female. Most of the participants

have completed a Bachelors (55%) or Master's (21%) degree. Table 1 shows the frequencies of participant demographics.

Table 1

Frequencies of Demographic Information About Participants in This Study (N = 374)

Category	*n*	%
Gender		
Male	189	51.50
Female	177	47.30
Gender diverse	6	1.60
Prefer not to say	2	0.50
Education		
Primary/ Secondary	33	8.80
Diploma	37	9.90
Bachelors degree	204	54.50
Master's degree	80	21.40
Doctoral degree	20	5.30
Professional level		
Labourer/ Tradespeople	14	3.70
Administrator/ Coordinator/ Office Staff	99	26.50
Technical Staff/ Professional Occupation	144	38.50
Manager	75	20.10
Senior Leadership	41	11.00
Other	1	0.30
Employment type		
Permanent full time	270	72.20
Permanent part-time	39	10.40
Fixed-term full time	28	7.50
Fixed-term part-time	20	5.30
Hourly paid	17	4.50
Industry		
Administrative and Support Services	22	5.90
Construction	11	2.90
Education and Training	34	9.10
Financial and Insurance Services	30	8.00
Health Care and Social Assistance	32	8.60
Information Media, Telecommunication and Information Technology	81	21.70
Manufacturing	25	6.70
Professional, Scientific and Technical Services	41	11.00
Public Administration and Safety	21	5.60
Retail Trade	29	7.80
Accommodation and Food Services & Rental, Hiring and Real Estate Services	13	3.50
Agriculture, Forestry and Fishing & Electricity, Gas, Water and Waste Services & Mining	13	3.50
Transport Postal and Warehousing & Wholesale Trade	11	2.90
Arts and Recreation Services & Other	11	2.90

Participants also reported information regarding their work such as their current position, their total years of work experience, the length of time they have spent in their current job, their employment contract type, and the industry they work in (see Table 1). In terms of professional level or job position, most of the participants were in a technical or professional occupation (39%), were administrator/ coordinator/ office staff (27%), or were in a managerial (20%) or senior leadership (11%) roles. Participants have been employed in their current jobs between 0 to 21 years (M = 4.36, SD = 4.94), with an overall work experience of 0 to 40 years (M = 11.38, SD = 9.29), where 0 years indicated they have been employed for less than one year. Eighty-two percent were permanently employed either full-time or part-time, 13% were on a fixed-term contract, and 5% were working as hourly paid staff. The top three industries represented were information media, telecommunication and information technology (22%), professional, scientific and technical services (11%), and education and training (9%). The mean satisfaction of needs scores across all participants was 3.49 (SD = 0.71) for the satisfaction of the need for autonomy, 4.04 (SD = 0.68) for the satisfaction of the need for competence, and 3.56 (SD = 0.78) for the satisfaction of the need for relatedness.

Effects of Workplace Settings on Autonomy

Descriptive Analysis: Autonomy

Descriptive analysis (see Appendix F) of gender differences showed there was only a 0.01 difference between the satisfaction of autonomy scores of males and females. Participants with the highest (doctoral) and lowest (primary or secondary) qualification had the top two highest satisfaction of autonomy scores respectively, while participants in the mid-tier in terms of qualification, i.e., had a Bachelors degree, had the lowest satisfaction of autonomy score. Despite this, results of correlational analysis showed that educational level was not significantly correlated with the satisfaction of autonomy, $r_s(372) = -.04$, $p = .47$. Age, on the other hand, did have a significant positive correlation to the satisfaction of autonomy, $r(372) = .16$, $p = .003$. Table 2 shows the results of correlational analysis.

Table 2

Correlational Analyses of the Need for Autonomy and Other Variables (N = 374)

	Variables	*M*	*SD*	1	2	3	4	5	6	7	8
Person correlation											
1	Autonomy	3.49	0.71	-							
2	Age	34.84	10.08	.16**	-						
3	Tenure	4.36	4.94	.05	.55**	-					
4	Experience	11.38	9.29	.17**	.85**	.60**	-				
5	Engaging Leadership	4.21	0.67	.41**	-.12*	-.09	-.10	-			
Spearman's rho											
6	Education	-	-	-.04					-		
7	Professional Level	-	-	.18**					.26**	-	
8	Employment Type	-	-	-.05					-.05	-.25**	-

Note. * $p < .05$, ** $p < .01$

The length of time a person spent in their current job (tenure) was not significantly correlated with the satisfaction of autonomy, $r(372) = .05$, $p = .30$, but the total years spent working (experience) had a significant positive relationship with the satisfaction of autonomy scores, $r(372) = .17$, $p < .001$. The mean scores among participants in different professional levels also suggested a significant positive correlation between professional level and the satisfaction of the need for autonomy, $r_s(372) = .18$, $p < .001$, such that participants felt their need for autonomy satisfied more if they were in more senior roles. Participants with a fixed term full time position had the highest mean satisfaction of autonomy score. Participants with a permanent full-time position, permanent part-time position, and hourly paid position had similar mean satisfaction of autonomy scores, while participants with a fixed-term part-time position reported the lowest satisfaction of autonomy score.

Among the different industries, the industry with the highest satisfaction of autonomy score was "Agriculture, Forestry and Fishing & Electricity, Gas, Water and Waste Services & Mining" followed by "Information Media, Telecommunication and Information Technology" and "Retail Trade" which had the same satisfaction of autonomy scores; "Arts and Recreation Services & Other" had the lowest satisfaction of autonomy score. With regards to a manager's

level of engaging leadership, a manager that practiced higher levels of engaging leadership was significantly correlated to higher satisfaction of the need for autonomy, $r(372) = .41$, $p < .001$.

One-way Analysis of Variance: Autonomy

Descriptive analysis of the satisfaction of autonomy scores across the different workplace settings (see Table 3) revealed that participants working from a remote office had the highest autonomy satisfaction scores. Participants working in an enclosed single-person office assigned only to themselves and participants working in a permanently assigned workstation or cubicle in an open plan space assigned only to themselves has similar mean scores, while participants in an enclosed office shared with others had the lowest satisfaction of autonomy scores.

A one-way analysis of variance showed that the mean scores for the satisfaction of the need for autonomy across the different workplace settings were significantly different, $F(4, 369) = 6.66$, $p < .001$ (refer to Appendix G to see the full table of F statistics). Post hoc analysis using both Tukey HSD and Bonferroni tell us that two groups were significantly different from each other. First, the mean satisfaction of autonomy score of participants in a remote office ($M = 3.53$, $SD = 0.71$) was significantly ($p < .001$) different from mean score of participants working in an enclosed office shared with others ($M = 3.26$, $SD = 0.63$). Second, participants

Table 3

Descriptive Analysis of the Satisfaction of the Need for Autonomy Across Workplace Settings (N = 374)

	Autonomy		
	n	*M*	*SD*
Workplace Setting			
An enclosed single-person office (assigned only to me)	51	3.53	0.71
An enclosed office shared with others	90	3.26	0.63
A permanently assigned workstation or cubicle in an open plan space (assigned only to me)	59	3.52	0.69
An open plan space permanently assigned to me and others (e.g., hot desk space in a open plan)	76	3.38	0.80
A remote office (e.g., a home office)	98	3.76	0.65

working in a remote office also had significantly (p = 0.01) higher satisfaction of autonomy mean score compared to participants working in an open plan space that is shared with others (M = 3.38, SD = 0.80).

Analysis of Covariance: Autonomy

Using an engaging leadership management style is known to impact the satisfaction of the need for autonomy (Deci et al., 2017; Rigby & Ryan, 2018; Schaufeli, 2015). Thus, the next step of the analysis was to determine whether the autonomy scores from participants in different workplace settings would still be significantly different after controlling for the effect of engaging leadership. Estimated marginal means are presented in Table 4. Analyses revealed that there was still a significant difference between the satisfaction of the need for autonomy across the five different workplace settings while controlling for engaging leadership, $F(4, 368) = 4.98$, $p < .001$, $\eta_p^2 = .05$. The effect size of workplace settings on the satisfaction of the need for autonomy was small. In particular, after controlling for the effects of the covariates, workplace settings accounted for 5% of the variance in the satisfaction of the need for autonomy. Appendix G shows the full table of F statistics.

Table 4

Descriptive Statistics for the Satisfaction of the Need for Autonomy by Workplace Setting Controlling for the Effects of Engaging Leadership (N = 374)

	Satisfaction of the need for autonomy
Workplace Setting	Adjusted Mean[a]
An enclosed single-person office (assigned only to me)	3.61
An enclosed office shared with others	3.32
A permanently assigned workstation or cubicle in an open plan space (assigned only to me)	3.49
An open plan space permanently assigned to me and others (e.g., hot desk space in a open plan)	3.37
A remote office (e.g., a home office)	3.69

[a] Covariates appearing in the model are evaluated at the following values: EL_total = 4.21.

Considering that the post hoc results from the analysis of variance revealed a

significant difference between (a) remote office and enclosed office shared with others and (b) remote office and shared open plan space, the ANCOVA analysis was re-run on these two pairs to determine whether the groups in each pair were still significantly different from each other after the addition of engaging leadership into the model. The need for autonomy scores of participants in a remote office was still significantly different from the scores of participants in an enclosed office shared with others, $F(1, 185) = 17.72$, $p < .001$, $\eta_p^2 = .09$. Similarly, the need for autonomy scores of participants in a remote office was significantly different from the scores of participants in a shared open plan space, $F(1, 171) = 9.38$, $p = .003$, $\eta_p^2 = .05$.

According to Deci et al. (2017) and Rigby and Ryan (2018), occupational characteristics and work context affect the satisfaction of psychological needs. Thus, in addition to the covariate already added (engaging leadership), work-related variables such as tenure (the length of time an employee has been working with their current employer), total years of working experience, professional level (e.g., job position), employment type (e.g. full-time, part-time, etc), and industry were added to the model to ascertain whether these variables would have an effect on how workplace settings affect the satisfaction of the need for autonomy. This second model revealed significant main effects of workplace settings on the satisfaction of the need for autonomy, $F(4, 344) = 2.39$, $p = .05$, $\eta_p^2 = .03$ (refer to Appendix G to see the full table of F statistics).

Post hoc analysis using ANCOVA on (a) remote office and enclosed office shared with others and (b) remote office and shared open plan space was again conducted. The need for autonomy scores of participants in a remote office was significantly different from the scores of participants in an enclosed office shared with others, $F(1, 161) = 4.58$, $p = .03$, $\eta_p^2 = .03$; the need for autonomy scores of participants in a remote office was also significantly different from the scores of participants in a shared open plan space, $F(1, 147) = 4.89$, $p = .03$, $\eta_p^2 = .03$. Estimated marginal means are presented in Table 5.

Table 5

Descriptive Statistics for the Satisfaction of the Need for Autonomy by Workplace Setting Controlling for the Effects of Engaging Leadership, Tenure and Experience (N = 374)

	Satisfaction of the need for autonomy
Workplace Setting	Adjusted Mean[a]
An enclosed single-person office (assigned only to me)	3.97
An enclosed office shared with others	3.75
A permanently assigned workstation or cubicle in an open plan space (assigned only to me)	3.87
An open plan space permanently assigned to me and others (e.g., hot desk space in a open plan)	3.80
A remote office (e.g., a home office)	4.02

[a] Covariates appearing in the model are evaluated at the following values: EL_total = 4.21, Tenure = 4.36, Experience = 11.38.

Finally, according to Deci et al. (2017), individual factors, i.e., personal demographics such as gender, age, and education, were known to affect the satisfaction of the need for autonomy. Therefore, personal demographics collected from the survey were added to create a third and final model to test the effects of workplace settings on the satisfaction of the need for autonomy while taking into account the effects of engaging leadership, work-related variables and personal demographics.

With all the variables included in the model, workplace settings did not have a significant main effect on the satisfaction of the need for autonomy, $F(4, 336) = 1.84$, $p = .12$, $\eta_p^2 = .02$. A comparison of observed means and estimated marginal means is presented in Table 6. Noteworthy was that although workplace settings was the only independent variable in this study, analyses revealed that professional level ($F(5, 336) = 3.30$, $p = .01$, $\eta_p^2 = .05$) and education ($F(4, 336) = 2.63$, $p = .03$, $\eta_p^2 = .03$) had significant main effects on the satisfaction of the need for autonomy (refer to Appendix G to see the full table of F statistics).

Table 6

Descriptive Statistics for the Satisfaction of the Need for Autonomy by Workplace Setting Controlling for the Effects of Engaging Leadership, Tenure, Experience and Age (N = 374)

	Satisfaction of the need for autonomy		
Workplace Setting	Observed Mean	Adjusted Mean[a]	*SD*
An enclosed single-person office (assigned only to me)	3.53	4.01	0.71
An enclosed office shared with others	3.26	3.85	0.63
A permanently assigned workstation or cubicle in an open plan space (assigned only to me)	3.52	3.95	0.69
An open plan space permanently assigned to me and others (e.g., hot desk space in a open plan)	3.38	3.87	0.80
A remote office (e.g., a home office)	3.76	4.09	0.65
Professional Level			
Labourer/ Tradespeople	3.33	3.49	0.20
Administrator/ Coordinator/ Office Staff	3.31	3.47	0.80
Technical Staff/ Professional Occupation	3.49	3.61	0.65
Manager	3.58	3.68	0.70
Senior Leadership	3.77	3.79	0.71
Other	5.00	5.69	-
Education			
Primary/ Secondary	3.70	4.16	0.53
Diploma	3.56	3.97	0.76
Bachelors degree	3.43	3.74	0.71
Master's degree	3.46	3.83	0.75
Doctoral degree	3.79	4.02	0.65

[a] Covariates appearing in the model are evaluated at the following values: EL_total = 4.21, Tenure = 4.36, Experience = 11.38, Age = 34.84.

Effects of Workplace Settings on the Need for Competence

Descriptive Analysis: Competence

Descriptive analysis of satisfaction of the need for competence is shown in Appendix H. Gender did not appear to impact the satisfaction of competence – males and females had the same mean satisfaction of competence scores – while age had a significant positive relationship with the satisfaction of competence, $r(372) = .30$, $p < .001$. The mean satisfaction of competence scores across different educational levels was at least 3.99 (participants with a

Bachelors degree) and at most a 4.46 (participants with a doctoral degree). Results of correlational analysis is shown in Table 7.

Unsurprisingly, there was a significant positive relationship between the satisfaction of competence scores and both the length of time a person spent in their current job (tenure), $r(372) = .18$, $p < .001$, and the total years spent working (experience), $r(372) = .29$, $p < .001$. Professional level also had a significant positive relationship with the satisfaction of competence, $r_s(372) = .17$, $p = .001$ wherein front-line positions like labourers, tradespeople, administrators and office staff had lower satisfaction of competence scores and participants with more senior positions such as managers and senior leadership had higher satisfaction of competence scores. Employment type, on the other hand, had a significant negative relationship with the satisfaction of competence, $r_s(372) = -.15$, $p = .003$, such that participants in more permanent positions showed higher satisfaction of competence and participants in fixed term or hourly paid positions showed lower satisfaction of competence.

Analysing the data by industry, "Health Care and Social Assistance" professionals was found to have the highest score for the satisfaction of the need for competence while participants in the "Arts and Recreation Services & Other" industry had the lowest satisfaction of competence score. Finally, with regards to leadership style, the level of engaging leadership

Table 7

Correlational Analyses of the Need for Competence and Other Variables (N = 374)

	Variables	*M*	*SD*	1	2	3	4	5	6	7	8
Person correlation											
1	Competence	4.04	0.68	-							
2	Age	34.84	10.08	.30**	-						
3	Tenure	4.36	4.94	.18**	.55**	-					
4	Experience	11.38	9.29	.29**	.85**	.60**	-				
5	Engaging Leadership	4.21	0.67	.21**	-.12*	-.09	-.10	-			
Spearman's rho											
6	Education	-	-	.04					-		
7	Professional Level	-	-	.17**					.26**	-	
8	Employment Type	-	-	-.15**					-.05	-.25**	-

Note. * $p < .05$, ** $p < .01$

of a manager was significantly positively correlated to the satisfaction of the need for competence, $r(372) = .21$, $p < .001$.

One-way Analysis of Variance: Competence

The main variable in this research was workplace settings. Descriptive analysis of the satisfaction of competence scores across the different workplace settings (see Table 8) revealed only a 0.13 difference between the highest and lowest satisfaction scores across the different workplace settings. The mean scores ranged from 4.10 for both participants working in an enclosed single-person office assigned only to themselves and participants working in a remote office workstation, to 3.97 for participants working in an open plan space shared with others.

A one-way analysis of variance was conducted to ascertain whether mean scores for the satisfaction of competence across the different workplace settings were significantly different from each other. Results showed that there was no significant difference between the satisfaction of the need for competence of participants in the different workplace settings, $F(4, 369) = 0.75$, $p = .56$ (refer to Appendix I to see the full table of F statistics).

Analysis of Covariance: Competence

The next step of the analysis was to determine what the effect of workplace settings on the need for competence would look like after controlling for the effect of other variables.

Table 8

Descriptive Analysis of the Satisfaction of the Need for Competence Across Workplace Settings (N = 374)

	Competence		
	n	*M*	*SD*
Workplace Setting			
An enclosed single-person office (assigned only to me)	51	4.10	0.67
An enclosed office shared with others	90	3.98	0.68
A permanently assigned workstation or cubicle in an open plan space (assigned only to me)	59	4.09	0.63
An open plan space permanently assigned to me and others (e.g., hot desk space in a open plan)	76	3.97	0.69
A remote office (e.g., a home office)	98	4.10	0.71

The first model tested included only engaging leadership as a covariate given that engaging leadership is known to affect the satisfaction of the need for competence. Estimated marginal means are presented in Table 9. Analyses revealed that the satisfaction of the need for competence reported by participants across the five different workplace settings were not significantly different even after controlling for the effects of engaging leadership, $F(4, 368) = 0.64$, $p = .64$, $\eta_p^2 = .01$ (refer to Appendix I to see the full table of F statistics).

Other workplace variables, namely tenure, experience, professional level, employment type and industry, were added to the model that already included the covariate engaging leadership to see whether they would change the impact workplace settings had on the satisfaction of the need for competence. In this second model, workplace settings did not have a significant main effect on the satisfaction of the need for competence, $F(4, 344) = 0.13$, $p = .97$, $\eta_p^2 < .01$ (refer to Appendix I to see the full table of F statistics). Estimated marginal means are presented in Table 10.

Finally, personal demographics (gender, age and education) were added to the model. The addition of personal demographics into the model did not change the outcome; workplace

Table 9

Descriptive Statistics for the Satisfaction of the Need for Competence by Workplace Setting Controlling for the Effects of Engaging Leadership (N = 374)

	Satisfaction of the need for competence
Workplace Setting	Adjusted Mean[a]
An enclosed single-person office (assigned only to me)	4.14
An enclosed office shared with others	4.01
A permanently assigned workstation or cubicle in an open plan space (assigned only to me)	4.07
An open plan space permanently assigned to me and others (e.g., hot desk space in a open plan)	3.96
A remote office (e.g., a home office)	4.06

[a] Covariates appearing in the model are evaluated at the following values: EL_total = 4.21.

settings did not have a main effect on the need for competence scores, $F(4, 336) = 0.20$, $p = .94$, $\eta_p^2 < .01$. Appendix I shows the full table of F statistics and estimated marginal means are presented in Table 11.

Table 10

Descriptive Statistics for the Satisfaction of the Need for Competence by Workplace Setting Controlling for the Effects of Engaging Leadership, Tenure and Experience (N = 374)

	Satisfaction of the need for competence
Workplace Setting	Adjusted Mean[a]
An enclosed single-person office (assigned only to me)	4.22
An enclosed office shared with others	4.19
A permanently assigned workstation or cubicle in an open plan space (assigned only to me)	4.23
An open plan space permanently assigned to me and others (e.g., hot desk space in a open plan)	4.16
A remote office (e.g., a home office)	4.22

[a] Covariates appearing in the model are evaluated at the following values: EL_total = 4.21, Tenure = 4.36, Experience = 11.38.

Table 11

Descriptive Statistics for the Satisfaction of the Need for Competence by Workplace Setting Controlling for the Effects of Engaging Leadership, Tenure, Experience and Age (N = 374)

	Satisfaction of the need for competence
Workplace Setting	Adjusted Mean[a]
An enclosed single-person office (assigned only to me)	4.06
An enclosed office shared with others	4.01
A permanently assigned workstation or cubicle in an open plan space (assigned only to me)	3.96
An open plan space permanently assigned to me and others (e.g., hot desk space in a open plan)	4.00
A remote office (e.g., a home office)	4.28

[a] Covariates appearing in the model are evaluated at the following values: EL_total = 4.21, Tenure = 4.36, Experience = 11.38, Age = 34.84.

Effects of Workplace Settings on the Need for Relatedness

Descriptive Analysis: Relatedness

Descriptive analysis in Appendix J lists a comparison between gender groups, which showed only a 0.03 difference between the satisfaction of relatedness scores of males and females. Educational level appeared to have a negative relationship with the satisfaction of relatedness, as in, participants with a doctoral degree had the lowest mean satisfaction of relatedness score while participants with a primary or secondary qualification had the highest satisfaction of relatedness score, though the relationship between educational level and the satisfaction of relatedness was nonsignificant, $r_s(372) = -.02$, $p = .66$. Age, however, was significantly positively related to the satisfaction of the need for relatedness, $r(372) = .13$, $p = .01$.

Tenure in one's current job was not correlated with the satisfaction of relatedness, $r(372) = .10$, $p = .06$, but participants' total years of work experience was significantly positively correlated with the satisfaction of relatedness, $r(372) = .14$, $p = .008$. There was also a significant positive relationship between professional level and the satisfaction of relatedness score, $r_s(372) = .21$, $p < .001$, and a significant negative relationship between employment type and the satisfaction of relatedness, $r_s(372) = -.15$, $p = .003$. These correlations, which are listed in Table 12, demonstrated that participants with more senior roles, such as managers and senior leadership, had higher satisfaction of relatedness scores compared to office staff or technical roles, and participants in more permanent positions also had higher satisfaction of relatedness scores compared to participants in fixed term or hourly paid positions.

Looking at the different industries, "Retail Trade" and "Financial and Insurance Services" had the first and second highest satisfaction of related scores respectively while "Arts and Recreation Services & Other" had the lowest satisfaction of relatedness score. Finally, the level of engaging leadership participants perceived from their managers had a significant positive relationship with the satisfaction of the need for relatedness, $r(372) = .36$, p

< .001, wherein participants who scored their manager higher on engaging leadership also reported higher satisfaction of the need for relatedness.

One-way Analysis of Variance: Relatedness

Descriptive analysis of the satisfaction of relatedness scores analysed by workplace settings (see Table 13) revealed that participants working in an enclosed single-person office had the lowest satisfaction of relatedness scores followed by participants working in a shared open plan space. Participants who had a workstation or cubicle permanently assigned to them

Table 12

Correlational Analyses of the Need for Relatedness and Other Variables (N = 374)

	Variables	*M*	*SD*	1	2	3	4	5	6	7	8
Person correlation											
1	Relatedness	3.56	0.78	-							
2	Age	34.84	10.08	.13*	-						
3	Tenure	4.36	4.94	.10	.55**	-					
4	Experience	11.38	9.29	.14**	.85**	.60**	-				
5	Engaging Leadership	4.21	0.67	.36**	-.12*	-.09	-.10	-			
Spearman's rho											
6	Education	-	-	-.02					-		
7	Professional Level	-	-	.21**					.26**	-	
8	Employment Type	-	-	-.15**					-.05	-.25**	-

Note. * $p < .05$, ** $p < .01$

Table 13

Descriptive Analysis of the Satisfaction of the Need for Relatedness Across Workplace Settings (N = 374)

	Relatedness		
	n	*M*	*SD*
Workplace Setting			
An enclosed single-person office (assigned only to me)	51	3.35	0.75
An enclosed office shared with others	90	3.60	0.77
A permanently assigned workstation or cubicle in an open plan space (assigned only to me)	59	3.65	0.78
An open plan space permanently assigned to me and others (e.g., hot desk space in a open plan)	76	3.55	0.81
A remote office (e.g., a home office)	98	3.58	0.78

in an open plan space and participants in an enclosed office shared with others reported the highest and second highest satisfaction of the need for relatedness respectively.

A one-way analysis of variance revealed that despite differences in mean satisfaction of relatedness scores, they were not statistically different across the different workplace settings, $F(4, 369) = 1.17$, $p = .32$ (refer to Appendix K to see the full table of F statistics).

Analysis of Covariance: Relatedness

The next step of the analysis aimed to determine the effect workplace settings would have on the need for relatedness while controlling for other variables. First, the covariate engaging leadership, which is a variable known to impact the satisfaction of the need for relatedness, was included in the model. Analyses revealed that the need for relatedness scores after controlling for engaging leadership were not different across the different workplace settings, $F(4, 368) = 1.08$, $p = .37$, $\eta_p^2 = .01$ (refer to Appendix K to see the full table of F statistics). Table 14 shows the estimated marginal means.

A second model was introduced that added the workplace variables tenure, experience, professional level, employment type and industry workplace variables (in addition

Table 14

Descriptive Statistics for the Satisfaction of the Need for Relatedness by Workplace Setting Controlling for the Effects of Engaging Leadership (N = 374)

	Satisfaction of the need for relatedness
Workplace Setting	Adjusted Mean[a]
An enclosed single-person office (assigned only to me)	3.43
An enclosed office shared with others	3.66
A permanently assigned workstation or cubicle in an open plan space (assigned only to me)	3.62
An open plan space permanently assigned to me and others (e.g., hot desk space in a open plan)	3.54
A remote office (e.g., a home office)	3.51

[a] Covariates appearing in the model are evaluated at the following values: EL_total = 4.21.

to the covariate engaging leadership already in the model) to see whether the introduction of these variables into the model would change the impact workplace settings had on the satisfaction of the need for relatedness. Estimated marginal means are presented in Table 15. In this second model, workplace settings did not have a significant main effect on the satisfaction of the need for competence, $F(4, 344) = 1.51$, $p = .20$, $\eta_p^2 = .02$ (refer to Appendix K to see the full table of F statistics).

Finally, personal demographics namely gender, age and education, were added to create a third model. A comparison of observed means and estimated marginal means is presented in Table 16. With all variables (engaging leadership, work-related variables, and personal demographics) included, workplace settings did not have a main effect on the satisfaction of the need for relatedness of participants, $F(4, 336) = 0.98$, $p = .42$, $\eta_p^2 = .01$. While workplace settings was the only independent variable of this study, it was noted nonetheless that professional level had a significant main effect on the satisfaction of the need for

Table 15

Descriptive Statistics for the Satisfaction of the Need for Relatedness by Workplace Setting Controlling for the Effects of Engaging Leadership, Tenure and Experience (N = 374)

	Satisfaction of the need for relatedness
Workplace Setting	Adjusted Mean[a]
An enclosed single-person office (assigned only to me)	3.53
An enclosed office shared with others	3.83
A permanently assigned workstation or cubicle in an open plan space (assigned only to me)	3.78
An open plan space permanently assigned to me and others (e.g., hot desk space in a open plan)	3.77
A remote office (e.g., a home office)	3.69

[a] Covariates appearing in the model are evaluated at the following values: EL_total = 4.21, Tenure = 4.36, Experience = 11.38.

Table 16

Descriptive Statistics for the Satisfaction of the Need for Relatedness by Workplace Setting Controlling for the Effects of Engaging Leadership, Tenure, Experience and Age (N = 374)

Workplace Setting	Satisfaction of the need for relatedness		
	Observed Mean	Adjusted Mean[a]	*SD*
An enclosed single-person office (assigned only to me)	3.35	3.57	0.75
An enclosed office shared with others	3.60	3.81	0.77
A permanently assigned workstation or cubicle in an open plan space (assigned only to me)	3.65	3.77	0.78
An open plan space permanently assigned to me and others (e.g., hot desk space in a open plan)	3.55	3.77	0.81
A remote office (e.g., a home office)	3.58	3.68	0.78
Professional Level			
Labourer/ Tradespeople	3.54	3.36	0.77
Administrator/ Coordinator/ Office Staff	3.40	3.35	0.75
Technical Staff/ Professional Occupation	3.46	3.43	0.79
Manager	3.79	3.70	0.74
Senior Leadership	3.86	3.77	0.75
Other	4.00	4.71	-

[a] Covariates appearing in the model are evaluated at the following values: EL_total = 4.21, Tenure = 4.36, Experience = 11.38, Age = 34.84.

relatedness, $F(5, 336) = 3.33$, $p = .01$, $\eta_p^2 = .05$ (refer to Appendix K to see the full table of F statistics).

Exploratory Results and Analysis

It was observed that the variable engaging leadership was significant throughout the different ANCOVA analyses for all three psychological needs. In particular, engaging leadership was found to have a significant main effect on the satisfaction of the need for autonomy, competence and relatedness in (a) the model that included workplace settings and engaging leadership, (b) the model that included workplace settings, engaging leadership, and work-related variables, and (c) the model that included workplace settings, engaging leadership, work-related variables, and personal demographics (see Appendices G, I and K). The core research questions of this study did not intend to analyse engaging leadership as a main

variable; up to this point, engaging leadership has been treated as a covariate. However, considering the significant effects of engaging leadership found throughout the analyses, it was worth exploring this further to confirm what was expected based on past research – that is, that there would be a significant relationship between engaging leadership and the satisfaction of psychological needs (Deci et al., 2017; Rigby & Ryan, 2018; Schaufeli, 2015).

Three streams of exploratory analysis using engaging leadership as the focal point were conducted. First a correlational analysis between engaging leadership and the satisfaction of psychological needs was conducted to identify whether relationships exist between leadership style and the satisfaction of the three psychological needs. Second, because the subscales within the engaging leadership scale, namely empowering, strengthening and connecting were known to correspond respectively to the needs for autonomy, competence, and relatedness (Schaufeli, 2015), a correlational analysis of the subscales against the three psychological needs was also conducted. Finally, to put these exploratory analyses within the context of this study, the above-mentioned correlational analyses were broken down by workplace settings to determine what those relationships look like across the different workplace settings.

Effects of Engaging Leadership on the Satisfaction of Psychological Needs

Table 17 presents a summary of the results of correlational analysis of engaging

Table 17

Correlational Analyses of Satisfaction of the Need for Autonomy, Competence and Relatedness against the Reported Level of Engaging Leadership (N = 374)

	Variables	*M*	*SD*	1	2	3	4	5	6	7
Person correlation										
1	Autonomy	3.49	0.71							
2	Competence	4.04	0.68							
3	Relatedness	3.56	0.78							
4	Engaging Leadership (EL)	4.21	0.67	.41**	.21**	.36**	-			
5	EL_Empowering	4.26	0.77	.44**	.23**	.31**	.89**	-		
6	EL_Strengthening	4.20	0.76	.35**	.18**	.31**	.91**	.73**	-	
7	EL_Connecting	4.13	0.78	.31**	.13*	.32**	.90**	.70**	.76**	-

Note. * $p < .05$, ** $p < .01$

leadership and the satisfaction of psychological needs. The overall engaging leadership scores reported by participants were significantly correlated to the satisfaction of the need for autonomy, competence and relatedness. A comparison of the relationship of the subscales and the satisfaction of the three psychological needs revealed, as expected, that the empowering subscale had the highest correlation with the satisfaction of the need for autonomy compared to the other two needs; and the connecting subscale had the highest correlation with the satisfaction for the need for relatedness compared to the other two needs. Unexpectedly, the relationship between the strengthening subscale and the satisfaction of the need for competence had the lowest correlation coefficient. Despite this, all the subscales were significantly correlated with the satisfaction of the needs for autonomy, competence and relatedness.

Correlational Analysis by Workplace Setting

The focus of this research was workplace settings so engaging leadership was analysed in the context of each workplace setting. In addition, because the subscales within the engaging leadership scale were known to correspond to the satisfaction of psychological needs (Schaufeli, 2015), the relationships of each subscale with their corresponding psychological need were also analysed in the context of each workplace setting. Correlation coefficients are presented in Table 18.

Enclosed Single-Person Office Assigned Only to Themselves. For participants in an enclosed single-person office assigned only to themselves, the overall engaging leadership score was found to be significantly correlated with the satisfaction of the need for relatedness only. A consistent result was obtained for the strengthening and connecting subscales – the strengthening subscale was not correlated with the satisfaction of competence and the connecting subscale had a significant positive correlation with only the satisfaction of the need for relatedness. Interestingly, even though overall engaging leadership scores were not correlated with the satisfaction of the need for autonomy, the empowering subscale did have a significant correlation with the satisfaction of the need for autonomy.

Table 18

Correlational Analyses of Satisfaction of the Need for Autonomy, Competence and Relatedness against the Reported Level of Engaging Leadership of Participants in Each of the Different Workplace Settings

	Variables	*M*	*SD*	1	2	3	4	5	6	7
Enclosed Single-Person Office Assigned Only to Themselves, *N* = 51										
1	Autonomy	3.53	0.71							
2	Competence	4.10	0.67							
3	Relatedness	3.35	0.75							
4	Engaging Leadership (EL)	4.03	0.72	.24	.17	.37**	-			
5	EL_Empowering	3.99	0.85	.30*	.28*	.36**	.89**	-		
6	EL_Strengthening	4.07	0.85	.18	.14	.28	.91**	.76**	-	
7	EL_Connecting	3.91	1.01	.15	.06	.28*	.95**	.74**	.83**	-
Enclosed Office Shared with Others, *N* = 90										
1	Autonomy	3.26	0.63							
2	Competence	3.98	0.68							
3	Relatedness	3.60	0.77							
4	Engaging Leadership (EL)	4.06	0.71	.51**	.30**	.52**	-			
5	EL_Empowering	4.11	0.81	.56**	.32**	.45**	.89**	-		
6	EL_Strengthening	4.02	0.83	.39**	. 29**	.43**	.90**	.71**	-	
7	EL_Connecting	4.02	0.83	.38**	.19	.47**	.88**	.66**	.70**	-
Open Plan Space with a Workstation or Cubicle Assigned Only Themselves, *N* = 59										
1	Autonomy	3.52	0.69							
2	Competence	4.09	0.63							
3	Relatedness	3.65	0.78							
4	Engaging Leadership (EL)	4.28	0.64	.46**	.22	.23	-			
5	EL_Empowering	4.28	0.79	.47**	.23	.18	.90**	-		
6	EL_Strengthening	4.30	0.69	.35**	.11	.18	.93**	.75**	-	
7	EL_Connecting	4.25	0.69	.42**	.22	.24	.91**	.69**	.81**	-
Open Plan Space Permanently Assigned to Themselves and Others, *N* = 76										
1	Autonomy	3.38	0.80							
2	Competence	3.97	0.69							
3	Relatedness	3.55	0.81							
4	Engaging Leadership (EL)	4.23	0.66	.43**	.22	.38**	-			
5	EL_Empowering	4.34	0.72	.48**	.31**	.35**	.90**	-		
6	EL_Strengthening	4.18	0.76	.38**	.17	.39**	.93**	.78**	-	
7	EL_Connecting	4.17	0.71	.33**	.10	.29*	.90**	.70**	.76**	-
Remote Office, *N* = 98										
1	Autonomy	3.76	0.65							
2	Competence	4.10	0.71							
3	Relatedness	3.58	0.78							
4	Engaging Leadership (EL)	4.37	0.59	.30**	.10	.22*	-			
5	EL_Empowering	4.48	0.65	.28**	.07	.15	.87**	-		
6	EL_Strengthening	4.37	0.66	.31**	.11	.20*	.90**	.66**	-	
7	EL_Connecting	4.27	0.66	.22*	.09	.23*	.90**	.68**	.73**	-

Note. * $p < .05$, ** $p < .01$

Enclosed Office Shared with Others. In this workplace setting, engaging leadership was correlated with all three psychological needs and all its subscales were also correlated with the psychological needs they correspond to. In fact, the subscales correlated even to psychological needs they do not correspond to.

Open Plan Space with a Workstation or Cubicle Assigned Only Themselves. Only the satisfaction of the need for autonomy had a significant positive correlation with engaging leadership. Also, all the subscales were correlated only with the satisfaction of the need for autonomy. Even the strengthening and connecting subscales, which were expected to be related to the needs of competence and relatedness respectively, were not significantly correlated with their corresponding needs.

Open Plan Space Permanently Assigned to Themselves and Others. Participants' reported levels of satisfaction of the need for autonomy and relatedness were correlated with scores on engaging leadership and all its subscales, but the satisfaction of the need for competence was not significantly correlated with engaging leadership. Results of the subscales aligned with results of engaging leadership, as in, all the subscales were correlated with the satisfaction of autonomy and relatedness but not competence. Even the strengthening subscale, which was supposed to be the subscale that corresponded to the satisfaction of the need for competence, was also not correlated with the need for competence.

Remote Office. Similar to a shared space in an open plan setting, the satisfaction of the need for competence appeared to be the only one that did not correlate with engaging leadership and its subscales. Even the strengthening subscale was not correlated with the need for competence though it was significantly correlated with the needs for autonomy and relatedness.

Discussion

This research aimed to contribute to an understanding of how workplace settings affect the need for autonomy, competence and relatedness while controlling for leadership style, occupational characteristics, and individual factors. Participants who worked in five different workplace settings rated how strongly they felt their need for autonomy, competence and relatedness were met while working from the workplace setting they nominated. Participants also reported on their manager's leadership style, work-related variables and personal demographics; these factors were controlled for in the analyses.

Overall, it was found that workplace settings had a significant relationship with the satisfaction of the need for autonomy, but not with the satisfaction of the need for competence and relatedness. Participants working from a remote workplace had significantly higher autonomy satisfaction scores compared to participants working from an enclosed office shared with others and also compared to participants using a shared open plan workspace. However, the main effect of workplace settings on any of the psychological needs became nonsignificant after controlling for the effects of the covariates (e.g., leadership style, age and tenure and years of experience) and other control variables (e.g., work-related variables and personal demographics). The following sections present a more in-depth discussion of the effects of workplace settings on each of the psychological needs.

Autonomy

The first three hypotheses of this research related to the satisfaction of the need for autonomy. First, it was hypothesised that (H1a) employees working remotely would show the highest satisfaction for the need for autonomy (Gajendran et al., 2015). Results from the analysis of variance showed that autonomy scores were highest for participants working from a remote office location and that the difference was statistically different compared to the autonomy scores of participants in shared enclosed offices and of participants in a shared open plan space. This result persisted when engaging leadership scores were added as a covariate and also persisted in the model that included engaging leadership and other work-

related variables (i.e., tenure, experience, professional level, employment type, and industry). In particular, the satisfaction of autonomy was significantly associated with workplace settings, and participants in a remote office location reported statistically higher satisfaction of autonomy compared to participants in either a shared enclosed office or in a shared open plan space.

In support of H1a, results suggested that when employees are not in the office, they feel they are able to manage their own time freely (Crouch & Nimran, 1989; Haan & Main, 2023), they don't feel like they are being watched (Crouch & Nimran, 1989) and they are able to juggle their personal and work lives according to how it suits them best (Graßmann & Decius, 2023; Haan & Main, 2023; Mazmanian et al., 2013). Being allowed to work remotely also signifies trust given to employees to get the job done in a way that suits them the most (Gibson et al., 2023), which aligns with conditions of autonomy, such as when one is given the choice on how to accomplish work tasks and goals. These reasons for why being away from the office might contribute to feelings of autonomy could apply to anyone irrespective of their manager's leadership style and irrespective of work-related variables like tenure, professional level or employment type, and so it makes sense that findings persisted in the initial ANCOVA analyses.

Another hypothesis was that (H2) workplace settings that are assigned to individuals (not shared) would satisfy the need for autonomy more than workplace settings that are shared (Gajendran et al., 2015). As above, when employees are in a space that they do not need to share with anyone else, not sharing a space could mean being less exposed to others and to others' scrutiny (Crouch & Nimran, 1989) therefore feeling they have more freedom over what they do and how they accomplish their tasks. However, results did not find support for this hypothesis. While workplace settings were found to be significantly associated with the satisfaction of the need for autonomy in the analysis of variance and also after engaging and other work-related variables were added to the model, post hoc analyses did not find

significant differences between individually assigned workplace settings and shared workplace settings.

Finally, it was also expected that (H3) employees in a shared workplace setting would report the lowest satisfaction for the need for autonomy (Gao et al., 2022). This hypothesis, like H1a, initially looked like it would be supported. The lowest satisfaction of autonomy scores were from either participants working from an enclosed office shared with others or from participants in a shared open plan space, and in fact, the results remained consistent in more than one model. The autonomy scores of participants from an enclosed office shared with others was statistically lower than the satisfaction of autonomy from participants in a remote office location in the analysis of variance, in the analysis of covariance with engaging leadership as a covariate, and in the analysis of covariance model that included engaging leadership and other work-related variables. Similarly, the same three analyses revealed that participants from an open plan space shared with others also have statistically lower autonomy scores compared to participants from a remote office.

However, despite seeming support for two of the autonomy-related hypotheses, it is important to note that the significant differences showing that those in remote offices scored higher in autonomy compared to those in enclosed shared offices and those in shared open plan offices became nonsignificant after controlling for engaging leadership, work-related variables, and personal demographics. Therefore, the first three hypothesis are ultimately rejected, alongside rejecting the hypothesis that (H5a) workplace setting would be significantly associated with the satisfaction of the need for autonomy even after controlling for leadership style, occupational characteristics and/or individual factors.

One possibility of why autonomy satisfaction was no longer statistically different between workplace settings is that while workplace settings may contribute to the satisfaction of the need for autonomy, the contributions a manager makes towards the satisfaction of the need for autonomy overshadows the impact of workplace settings. Results of this study showed that the amount of variance explained by workplace settings progressively decreased

as variables were added into the model, whereas the amount of variance explained by engaging leadership increased as more variables were added into the model. Literature would support the idea that leadership is a dominant factor in the satisfaction of psychological needs (Deci et al., 2017; Rigby & Ryan, 2018; Schaufeli, 2015; van Tuin et al., 2020; van Tuin et al., 2021). Autonomy is about feeling a sense of control and about having a choice. The degree of autonomy an employee has is determined by the amount of autonomy a leader allows an employee to exert. So, instead of viewing the physical environment as an instrument that empowers an individual to feel autonomous, another way to look at it is, after being given permission by a manager to make decisions, i.e., be autonomous, an individual expresses their felt sense of autonomy not only over not their work but also over the workspace they occupy. Looking at it this way views the manager as the agent of autonomy and workplace setting as the canvas to express autonomy. This study is unable to establish causation but does prove that engaging leadership is correlated with the satisfaction of psychological needs.

Apart from leadership style potentially being associated with and explaining more of the variance in autonomy satisfaction than workplace settings, it is possible that professional level also adds to the satisfaction of the need for autonomy more than workplace settings and is what could be reducing the effects of workplace settings. Results from this research support this theory – in this study, employees with more senior roles reported higher satisfaction of the need for autonomy. In an organisational structure, employees in more senior roles are often tasked with decision making, and so by virtue of that, need to have the autonomy to make decisions. Leaders are also the ones who define the strategy, priorities, culture, policies, etc. within organisations; are followed rather than is the one following; and so, it is not surprising that being in a position that increasingly grants one decision making powers would translate to higher autonomy satisfaction.

Other factors that could be contributing to the satisfaction of the need for autonomy, which leads to the main effect of workplace setting becoming nonsignificant, are personal demographics (Deci et al., 2017). Age, in particular, is one possible consideration. As

individuals grow older, they become less concerned with what others think and feel less need to conform (Lataster et al., 2022). Descriptive analysis from this research confirmed that age does have a significant positive correlation with the satisfaction of the need for autonomy; the research of Lataster et al. (2022) similarly found that there is a "linear increase in autonomy satisfaction with age" (p. 2279).

Finally, adding yet another variable, education, might have explained some of the variance in autonomy and thus, contributed to the nonsignificant effect of workplace settings. In the current study, education was significantly related to the satisfaction of the need for autonomy. Those whose highest qualification is a primary or secondary school qualification reported the highest satisfaction of the need for autonomy. A decrease in the satisfaction of the need for autonomy was seem among those who attained higher education levels, such that those with a master's degree reported the lowest satisfaction of the need for autonomy, but then those with a doctoral degree reported once again higher satisfaction of autonomy scores that were similar to those with a primary or secondary qualification.

These results could potentially be explained using the analogy of a child learning the rules of social interactions. Individuals whose highest qualification is a primary or secondary qualification could be likened to a young child who speaks freely and without inhibitions. As the saying goes, "kids say the darndest things." Achieving higher qualifications is then similar to getting older and learning the rules of social etiquette. There is now a concept of words needing to be chosen more carefully so as not to be impolite. The imposition of these rules coupled with the awareness of not yet mastering the skills for proper social etiquette is what could be leading to reduced feelings of autonomy. Eventually, the child grows up to a point where social etiquette becomes second nature such that it is not anymore viewed as inhibiting. Achieving a doctoral degree and becoming a master of their craft could be viewed as analogous to this stage and which would explain why the satisfaction of the need for autonomy increases once again.

Research on education and control at work (Ross & Reskin, 1992) also confirm that education is significantly associated with levels of autonomy at work. In particular, it was found that individuals with higher qualifications achieve a sense of satisfaction from jobs that allow more autonomy, e.g., jobs that provide non-routine work tasks, supervisory roles, or roles that have decision making authority over budgets, and so they seek out autonomy-satisfying work (Ross & Reskin, 1992). Thus, it is not surprising to see in this study that those with the highest educational level reported the highest autonomy satisfaction.

In summary, when analysing autonomy and workplace settings on its own, it appeared that there is a relationship between workplace setting and the satisfaction of the need for autonomy and that in particular, working remotely satisfies the need for autonomy the most. Even after controlling for leadership style and other work-related variables, workplace settings were still significantly associated with the satisfaction of the need for autonomy, and a remote office location still satisfied the need for autonomy the most. However, it is deemed necessary to mention that employees should be wary about the heightened sense of autonomy that they might feel when working remotely. Mazmanian et al. (2013) introduced the concept of autonomy paradox to explain that when employees say they feel they are more productive when working remotely (Andrews, 2021), they potentially are really working more. For example, when working from home, it is easy to lose track of time and blur the lines between when work ends and home life begins (Mazmanian et al., 2013). Mazmanian et al. (2013) also found that because employees feel grateful for the trust and flexibility awarded to them, they subconsciously feel the need to repay their organisation, which results in employees *choosing* to work harder and go over and beyond.

Furthermore, despite the significant relationship between workplace settings and autonomy in the analysis of variance and after controlling for engaging leadership and work-related variables, it must be recognised that this result did not persist in the fully adjusted model, i.e., after all other factors in this study were included in the analysis. This study found that factors such as leadership style, professional level, age, and education, also contribute to

the satisfaction of the need for autonomy. This allows individuals to draw autonomy from other factors regardless of the type of workplace setting they use and could thus be the reason why the effects of workplace settings become nonsignificant when other variables are added to the model.

Competence

This study also aimed to see the effects of workplace settings on the satisfaction of the need for competence and, like with autonomy, hypothesised that (H1b) employees working remotely would show the highest satisfaction of the need for competence (Gajendran et al., 2015). However, this hypothesis is rejected. It was found that participants' reported level of satisfaction of the need for competence in a remote office was not higher compared to participants' reported level of satisfaction from other workplace settings. After controlling for leadership style, work-related variables and personal demographics, the adjusted mean did become highest for participants in a remote office location but the difference was still not statistically significant, meaning the differences found between groups of participants was unlikely due to workplace settings, thus rejecting the fifth (H5b) hypothesis.

Deci et al.'s (2017) self-determination theory in the workplace explains that leadership style, organisational factors and individual factors contribute to the satisfaction of the need for competence. This research proposed to add workplace setting to the model, but findings confirmed that workplace settings perhaps does not need to be added. Four possible explanations for these findings are outlined.

The first explanation involves the timing of this study. Data collection occurred during a time where flexible working arrangements has become more mainstream as a result of employees and organisations having had the opportunity to learn and gain confidence with using tools that enable employees to work from different workplace settings, which was a requirement during the Covid-19 enforced lockdowns. For example, pre-Covid, one of the primary tools used to verbally communicate with colleagues and customers was a desk phone that required employees to be at their desks to answer work calls. When Covid-19 broke out,

organisations had to start using digital tools like Teams and Zoom to verbally communicate with each other. From personal experience in the organisation I work at, when Teams was first introduced, there was some animosity at having to learn how to use this new tool and also apprehension at the idea of desk phones being decommissioned. But within a few months, using Teams became fully embedded and employees started voluntarily giving up their desk phones. This evidenced competence in using digital communication tools that removed the necessity to be at just one workplace setting. Considering how employees are now equipped with tools that enable them to accomplish their tasks from any workplace setting, it is logical to assume that workplace settings are less relevant at contributing to the satisfaction of the need for competence. In fact, it is possible that what contributes to the satisfaction of competence could perhaps be the ability to adapt and learn new technologies that enables one to get the job done regardless of where they work from (Gibson et al., 2023) instead of workplace settings themselves. Unfortunately, the ability to adapt and learn new technologies were not variables captured or included in this study.

The second explanation stems from employees' engagement with learning experiences. Competence is about feeling like one has the skills and knowledge to be successful at a task (Rigby & Ryan, 2018) and so to some extent, participating in learning activities boosts feelings of competence. Research shows that a situation that reduces the separation between work and private life increases employees' engagement with informal work learning experiences, which therefore contributes to enhanced feelings of competence (Graßmann & Decius, 2023). While this provides grounding for why it was worth examining the effects of workplace settings on the satisfaction of competence, research further suggests that the strongest predictor of engagement in informal work learning experiences is relevance of work (Graßmann & Decius, 2023). Thus, as long as employees believe that their work is important, they will engage in learning experiences, both formal and informal, that then contribute to their feelings of competence regardless of their workplace setting.

Apart from the satisfaction of competence growing out of developing the skills that contribute to being successful at a task, competence is also facilitated by having the appropriate resources to complete the task. Thus, the third rationale this paper presents to help explain the nonsignificant relationship of competence and workplace settings stem from research that investigated employees' perception of whether a particular kind of workplace setting helped them be more productive. It was found that participants over 50 years old believe that workplace settings do facilitate productivity but only if their workplace setting is an enclosed offices assigned to themselves. For participants below 50 years old, all workplace settings were viewed as being equally effective at facilitating productivity. This suggests that age plays a part in whether or not workplace settings impact the need for competence (Boge et al., 2019) and would explain why workplace settings as the only independent variable produced nonsignificant results.

Fourth and last, similar to the satisfaction of the need for autonomy, it is expected that leadership style would be a strong predictor of the satisfaction of psychological needs (Deci et al., 2017; Rigby & Ryan, 2018; Schaufeli, 2015; van Tuin et al., 2020; van Tuin et al., 2021). This is precisely why engaging leadership was controlled for as a covariate in the first place. The nonsignificant results from workplace settings, and the significant main effects from engaging leadership, confirmed that as long as an employee has a manager that takes actions that satisfy an employee's need for competence, where they work from or the type of workplace they use almost becomes irrelevant. In fact, a manager's confidence in their employee's ability to successfully get the job done from any workplace setting might in itself contribute to satisfying the need for competence (Gibson et al., 2023).

Thus, in support of the basic self-determination theory model in the workplace by Deci et al. (2017), what leads to feelings of competence are factors such as (a) an individuals' level of confidence with the resources available within the workplace setting, (b) engagement with learning experiences which is motivated by perception of job relevance, (c) differences in perception of suitability of workplace settings brought about by age, and finally (d) leadership

style. Thus, it would appear that workplace settings do not need to be added to the current self-determination theory model in the workplace.

Relatedness

The last dependent variable in this study is the satisfaction of the need for relatedness where it was hypothesised that (H4) employees in an open-plan space would show the highest satisfaction for the need for relatedness (Andrews, 2021; Gao et al., 2022; Kudyba, 2020). Results showed that there were no significant differences in feelings of relatedness across different workplace settings, thus, rejecting the hypothesis. Adding leadership style, work-related variables, and personal demographics to the analysis did not change the results. Therefore, the hypothesis that (H5c) workplace settings would be significantly associated with the satisfaction of the need for relatedness even after controlling for leadership style, occupational characteristics and/or individual factors is also rejected.

An enclosed office space shared with others creates an environment where individuals are in close proximity to each other and where individuals spend time with each other and so it makes sense that, contrary to what was hypothesised, perhaps an enclosed office shared with others is the type of workplace setting that would satisfy the need for relatedness the most (Andrews, 2021; Gao et al., 2022; Kudyba, 2020). Furthermore, Ayoko and Härtel (2003) found that when employees are able to customise a space to reflect their group identity, the space will facilitate a sense of belongingness thereby becoming a means to satisfy the need for relatedness. Among all the types of workplace settings included in this study, an enclosed workspace that belongs exclusively to a team is most conducive for expressing a team's culture and identity and so again, in hindsight, perhaps it is this type of workplace setting that would lead to higher satisfaction of the need for relatedness more than an open plan workstation.

However, these reasons still don't explain why significant differences between workplace settings were not found in this study. One explanation for why workplace settings are not significantly associated with the satisfaction of the need for relatedness is because

results of this study showed that there are other factors that contribute to the satisfaction of this need more than workplace settings.

Professional level is one factor that was treated as a covariate in this study, but which was significantly associated with the satisfaction of the need for relatedness. Results showed that more senior roles have higher satisfaction of the need for relatedness. This could be explained by the nature of roles within an organisational hierarchy. Usually, front line roles do more repetitive tasks and as employees attain more senior roles, they slowly move towards being tasked with the responsibility of negotiating with other leaders to determine organisational priorities. Because more senior roles inherently involve activities that involve collaboration with other people, it makes sense why more senior roles reported higher levels of satisfaction of the need for relatedness.

Engaging leadership, also a covariate in this study, was also significantly associated with the satisfaction of the need for relatedness. This tells us that the leadership style of a manager can facilitate the satisfaction of the need for relatedness, probably significantly enough that the effects of workplace setting become almost negligible. In support of this idea, Gibson et al. (2023) posit that there are multiple ways to foster relationships at work, and it is up to the manager to consider employees' individual preferences, strengths and weaknesses, and the tools and environments available, to then develop strategies to build team culture.

Other possible reasons why this study did not find a significant association between workplace settings and the satisfaction of the need for relatedness involve factors that were not included in this research. For example, this study did not measure the amount of time employees spend in their nominated workplace setting. However, this could have been an important detail that was overlooked. Boge et al. (2019) found that when employees spend less than 10 hours a week in their workplace setting, they perceive that some workplace settings are more effective than others at facilitating collaboration and socialisation; when employees spend more than 10 hours per week in their workplace setting, they rate all workplace setting types as equally effective at facilitating collaboration and socialisation. In

the current study, participants were asked to choose the workplace setting they used the most without asking participants to report the specific number of hours they spent in their nominated workplace setting. Based on the idea that participants nominated a workplace setting they use the most, coupled with the fact that majority of the participants in this research work full time, it is likely that most of the participants use their nominated space for more than 10 hours per week. Spending a considerable amount of time in a workplace setting allows individuals to develop strategies, like virtual coffee catch-ups, joining on-line team games, having agreed team days, etc., to still stay connected despite working in physically different locations, making the satisfaction of the need for relatedness less dependent on workplace settings (Boge et al., 2019).

Lastly, another variable not captured, but which could explain why workplace settings did not have a significant association with the satisfaction of the need for relatedness, is the presence of people in any given workplace setting (Crouch & Nimran, 1989). This points to the idea that it is not workplace settings themselves that contribute to satisfying the need for relatedness, but rather the presence, whether physically or virtually, of colleagues. Come to think of it, even if you are in the office, if no one is there, then who would you socialise with; or even if you are online, if there is no one else online, who would you talk to? Taking this into consideration, it is once again necessary to reflect on current working arrangements.

When lockdown was enforced during the Covid-19 outbreak, employees needed to work from home. Today, after the Covid-19 pandemic, many employees continue to work from home, if not every day at least a few days a week. From personal experience the office became emptier and quieter post-pandemic. The fact that there just are not as many people around in the office could be a reason why workplace settings and the satisfaction of the need for relatedness did not have a significant association. Additionally, even if the office has less people, the series of events starting from the Covid-19 outbreak to post-Covid gave employees the opportunity to learn how to still build relationships while being away from each other (e.g.,

by using newly introduced digital tools) making the satisfaction of employees' need for relatedness less reliant on workplace settings.

In conclusion, it is common to hear or read that open plan workplace settings are more effective at facilitating communication and collaboration among colleagues. However, this study did not find evidence to support that there is a difference in the satisfaction of the need for relatedness across different workplace settings. It is possible that there are other factors, such as the type of work brought about by different professional levels and a manager's leadership style, that contribute to developing relationships more than workplace setting. More importantly, it is possible that the norm has changed. Just like how the invention of the internet has made the world "smaller" (i.e., the internet has made it easier to interact and connect with people all over the world), the availability of tools that enable work teams to stay connected even while being in physically different workplace settings could be the reason why the satisfaction of the need for relatedness was not significantly associated with workplace settings.

Engaging Leadership: An Exploratory Analysis

The satisfaction of the need for autonomy, competence and relatedness of participants working in different workplace settings were not significantly different from each other after controlling for the effects of leadership style, occupational characteristics and individual factors, and out of all the variables, only leadership style was consistently associated with the satisfaction of the three psychological needs. Although not anymore part of the original question, further exploratory analyses were conducted to look deeper into the significant effects of leadership style on the satisfaction of psychological needs.

Overall Engaging Leadership and Its Subscales

Consistent with the main effects of leadership in the analyses of covariance, overall engaging leadership scores were positively correlated with the satisfaction of all three psychological needs. This result means that as engaging leadership increases, the satisfaction for the need for autonomy, competence and relatedness also increases. Thus, as expected,

engaging leadership is a leadership style that aims specifically to satisfy psychological needs with the expectation that the satisfaction of psychological needs will contribute to employees' motivation and well-being (Schaufeli, 2015).

In addition, the engaging leadership scale has three subscales that supposedly correspond to each of the three psychological needs – the empowering subscale to the need for autonomy, the strengthening subscale to the need for competence, and the connecting subscale to the need for relatedness (Schaufeli, 2015). Overall, the three subscales of the engaging leadership scale, empowering, strengthening and connecting, were positively correlated, not just with their corresponding need, but with the satisfaction of all three psychological needs.

Engaging Leadership by Workplace Setting

Despite the overall correlations found between engaging leadership and the satisfaction of psychological needs, the results were not as straightforward when the relationship between engaging leadership and the satisfaction of psychological needs were broken down by the five workplace settings. First, looking at an enclosed single person office, results showed that leadership was correlated only with the need for relatedness such that as engaging leadership increases, satisfaction of the need for relatedness also increases, but not the satisfaction of the need for competence and autonomy. Second, results from participants in an enclosed office shared with others showed that engaging leadership was significantly positively correlated with the satisfaction of all three needs. Third, for participants in an assigned workstation located in an open plan setting, engaging leadership was significantly related only to the satisfaction of the need for autonomy. Finally, for participants in a shared workstation in an open plan setting and for participants in a remote office, as engaging leadership scores increased, the satisfaction of the need for autonomy and also of the need for relatedness, but not the need for competence, also increased.

The results of the subscales are also of interest because again, scores on the subscales did not show consistent correlations between the subscale and the psychological need they

correspond to once data was broken down by workplace setting. For example, the strengthening subscale corresponded to the need for competence, as expected, for participants in an enclosed office shared with others but not for participants in any other workplace setting. This suggests that an increase in scores on the strengthening subscale do not correspond with an increase of satisfaction of the need for competence if participants work from a single-person enclosed office, a shared or dedicated workstation in an open plan setting, or in a remote office. As another example, the connecting subscale was not correlated with the satisfaction of the need for relatedness for participants working in a dedicated workstation located in an open plan setting. An interpretation of this result could be that even if leaders increase their connecting leadership behaviours, an increase in the satisfaction of the need for relatedness would not be expected if the employee were in a dedicated workstation located in an open plan setting. Among the three subscales, it was only the empowering subscale that showed a consistent correlation with the satisfaction of the need for autonomy across all workplace settings.

Analysis of the Effects of Engaging Leadership

This paper presents a few reasons that could explain the mixed results regarding the relationship of engaging leadership and the satisfaction of psychological needs once results were broken down by workplace setting. First of all, results from this study could be explained by the idea that managers change their leadership style depending on the situation, and they do that for various reasons. One theory suggests that psychological needs are actually satisfied through the provision of job resources and that leadership comes into the picture in two ways: first, leaders provide the resources that will meet psychological needs, and second, leaders stay mindful about what needs are already met by available resources and then they supplement any gaps (Rahmadani et al., 2020). Results of this study provided examples to support the idea that leaders change their management style depending on job resources.

Managers changing their leadership style was evident in the result that the satisfaction of the needs for competence and relatedness were not correlated with engaging leadership

for participants in an assigned workstation located in an open plan setting. One presumption could be because the workstation is in an open plan setting, colleagues, who could provide help are easily accessible. The proximity with colleagues could also facilitate relationship building. Thus, it could be intentional on the part of the leader to focus on the satisfaction of autonomy if they feel there are already resources available to facilitate competence and relatedness. Managers adjusting their leadership style based on job resources would explain why overall engaging leadership was correlated to the satisfaction of all three needs – such results could be a manifestation of employees appreciating their leaders who either provide resources to meet needs or who take direct actions to meet their needs. But then, when the relationship of psychological needs and leaders' actions within a workplace setting was examined, it was seen that in some environments, only some needs were directly related with leadership style.

Apart from job resources, another example of why leaders change their leadership style is because some leadership styles are conducive in some types of workplace settings while other leadership styles are difficult to implement due to the type of workplace setting (Danielsson et al., 2013). Managers' behaviours change depending on who is visible and who is audible from their workstation (Crouch & Nimran, 1989). Unfortunately, this research did not capture who participants shared their nominated workplace setting with (e.g., do the participants and their manager share a room?) and so cannot ascertain whether sharing a workspace with a manager could be the reason for the unexpected results. This research also did not capture the workplace setting of the manager. An analysis of the interaction of workplace settings and professional level could potentially have been conducted to test the effects of the workplace setting of the manager on the manager's leadership style. However, investigating the effect of workplace settings on leadership style was out of scope of this research question and so was not investigated.

Nonetheless, the flexibility and adaptability of a leader's behaviour could be an argument for why overall engaging leadership scores were related to the satisfaction of

psychological needs, but once broken down, revealed mixed findings. Granular feelings of employees and strategies of managers within specific workplace settings are possibly different from overall employee sentiments and overall management style because breaking it down to specific workplace settings exposes results to nuances brought about by different workplace settings which many not anymore be reflective of overall results.

As a final point, recall that the survey used in this study started off with participants completing the engaging leadership scale, then choosing the workplace setting they use the most, and then finally answering the work-related basic need satisfaction scale while thinking of their nominated workplace setting. According to Danielsson et al. (2013), an employee's perception of their manager is influenced by workplace settings. Thus, if the intention is to look at how workplace settings and leadership style interact with each other, then asking participants to rate their manager's leadership style before asking for workplace setting information possibly leads participants to think of leadership style outside of the context of their nominated workplace setting. They therefore could have rated their manager, thinking of their manager's overall actions and behaviours irrespective of workplace settings. If this is the case, then results are inconclusive because on one hand participants were rating their manager's leadership style without being prompted to think of their workplace setting, while on the other hand participants were rating their satisfaction of psychological needs after being prompted to think of their nominated workplace setting.

Thus, in summary, this study confirmed that engaging leadership facilitates the satisfaction of the needs for autonomy, competence and relatedness. However, leadership can be complex and requires leaders to constantly adapt their actions according to each situation. Therefore, for this study, it is advisable that the concept of leadership is viewed from a holistic lens, though caution must be taken in making any conclusions considering that engaging leadership might have been evaluated out of context of workplace settings. For future studies, researchers should consider carefully how the concept of leadership is measured so that it addresses the construct within the context of the research question.

Limitations and Recommendations

To recap, this study did not find significant effects from workplace settings on the satisfaction of psychological needs once covariates were included in the model. Engaging leadership did have a consistent relationship with the satisfaction of psychological needs though how workplace settings fit within the relationship of engaging leadership and the satisfaction of need is inconclusive. Amidst the findings and explanations presented thus far, it must be recognised that this study has its own limitations.

First, literature would suggest that this study failed to find significant effects from workplace settings on psychological needs once covariates were included in the model because, in addition to factors mentioned earlier in the discussion that relate to the different psychological needs individually, there are individual factors that were not measured in this research that could have had an impact on the way workplace settings contribute to the satisfaction of psychological needs. For example, culture can colour an individuals' view about a workplace setting (Ayoko & Härtel, 2003). Some individuals, depending on their culture, view the office as a mechanism to control conflict, while others view the office setting as a trigger for conflict. Also, some cultures treat the office as a social collaborative space, while other cultures view the office as a formal and quiet space that enables concentration and minimal distraction. The survey used for data collection in this study was posted online and was accessible to participants all over the world, and yet information like country of residence was not captured. Workplace settings could potentially have had an interaction effect with culture where for example, workplace might have an effect on the satisfaction of the need for relatedness for cultures that view the office as a social space but not have an effect on the need for relatedness for cultures that view the office as a formal and quiet space.

Thinking of culture as a moderator suggests that an individual's perception of and expectations from workplace settings (Ahrentzen, 1989; Ayoko & Härtel, 2003; Oldham, 1988) makes a difference. This idea that existed as early as 1989. Ahrentzen (1989) conducted a mixed methods study among workers who worked from home. It was found that having a

workspace at home was viewed positively or negatively depending on the participants marital and family status. A participant would view working from home positively or negatively depending on whether the participant was single, married, married but with no children, married with children, a single parent, etc. Those who perceived working from home in a positively light describe the home office as a refuge; those who viewed working from home negatively felt that the home office was a trap. Thus, it was the perception of the home office, whether it was a positive environment or a negative environment, that led to whether autonomy was satisfied (not trapped) or not satisfied (feel trapped).

Another example of individual factors not measured in this research are those found in the research of Oldham (1988). Oldham conducted a quasi-experiment where employees moved from an existing open plan office space to either a new space with lower density, or a new space with desks that were surrounded with partitions. It was found that people have different levels of stimulus screening ("the degree to which the employee is able to effectively reduce the stress of numerous stimuli" (p. 255)) and different levels of need for privacy ("an individual's need for physical isolation from stimuli" (p. 255)) and these factors influence employees' office satisfaction. This once again indicates that the same space could be satisfactory to one employee, but not to another, depending on their individual preferences and expectations from workplace settings.

Some factors, such as those just mentioned, were not captured primarily because in this study, only "typical" work and personal demographics such as professional level, industry, educational level, age, etc. were collected. However, the study could have gained richer insights had individual factors such as culture (Ayoko and Härtel, 2003), need for privacy (Oldham, 1988), perception of relevance of work (Graßmann & Decius, 2023), and family situation (Ahrentzen, 1989) been collected. Similarly, with regards to the effects of occupational characteristics, more meaningful conclusions may have been derived if for example, instead of making assumptions about occupational characteristics based on professional level and industry (e.g., in the interpretation of results it was assumed that front

line workers do repetitive tasks and more senior roles require negotiating and building relationships with leaders of other teams), participants were given a chance to explain what they did in their roles to give more insight into how much social interaction they had in their day-to-day work. Further, data collected regarding workplace settings was unidimensional. More meaningful analysis could potentially have been gathered if workplace setting data like the specific type of remote workspace, time spent in each workspace (Boge et al., 2019), the number of people in the workspace and who the workspace is shared with (Crouch & Nimran, 1989) were collected.

Minimising assumptions by focusing on observable measures is a tenet of the principles of parsimony (Aarts, 2007; Epstein, 1984), which could have been applied more in the design of this study to make the research more robust. For example, workplace settings were measured by asking participants to "[s]elect the workplace setting that best describes what [they] currently use the most during the course of [their] work?" As discussed, knowing the number of hours spent in the workplace setting might have been valuable and so perhaps the survey could have asked participants to select all the types of workplaces they used and then report the approximate amount of time they spent in each type of workplace. This way, the data would have been more concrete and observable and assumptions regarding what "most" means to participants would not have had to be made.

In addition, as mentioned above, the data collected to represent "occupational characteristics" and "individual factors" also came with a lot of assumptions. Interpretation of the results relating to "age" would have come with the assumption of need preferences changing as a result of maturity or changes in family status. However, just directly asking for family status would have given more insight into the individual's current situation and resulting preferences, and so there would have been less reliance on the assumptions such as "younger participants are probably single and older participants probably have families." The same thing can be said of the way "occupational characteristics" were measured. For instance, with the variable professional level, it was assumed that more senior roles have more decision-

making responsibilities. While this is a reasonable assumption, using measures that directly ask for and measure the amount of decision making an individual makes in their role would have reduced the need to make assumptions.

In addition to reducing assumptions, the principle of parsimony also recommends preferring the simplest answer (Epstein, 1984). This could involve including as few variables as possible. Some variables in this study are correlated with each other and while they measure different things, in the spirit of parsimony, it might be worth evaluating the necessity of including all the variables in the models. For example, rather than including both tenure and years of work experience could maybe one of the two be left out?

Also, while adding control variables intends to control for their effects, having too many control variables might inadvertently add complexity (Aarts, 2007). Using again years of work experience as an example, adding this as a variable raises the question of the type of work experience participants have had and what effect that might have had. There is also the matter of whether participants reported the same thing. For example, did participants understand this question as formal work experience or did they include small jobs they did as they were growing up (things like mowing someone's lawn, or offering babysitting services); and what counts as "formal work experience?" If there is no previous research to substantiate adding this variable as a control variable, then again, following the principle of parsimony, it might have been better to leave out this variable.

Last but not least, this study could also be improved by re-evaluating its design. It is possible that there are interaction effects between workplace setting and variables that were treated as control variables. However, because testing for interaction effects was not part of the original design, the analysis of interaction effects was left out of scope. In addition, using a mixed method design, like for example combining quantitative and qualitative methods, may have been able to mitigate some of the limitations mentioned regarding data collection – following up the quantitative survey with qualitative interviews maybe have given the opportunity to clarify assumptions made. This was also a quasi-experiment that measured

constructs as they naturally occurred rather than by controlling variables as would have been done had this been an experiment. Because of this, even if there were significant results, causation would not have been established. In addition, considering the effects of Covid-19 and the re-negotiation of norms around workplace settings that needed to happen during the pandemic, a research design that allowed for a comparison before, during and after Covid-19 might have been better to ascertain whether the relevance of workplace settings changed throughout different points in time. However, the timing of this research project limited data collection to only after Covid-19, making it impossible to measure longitudinal data.

While doing the data analysis, it was recognised that there were a lot of variables included in this study. Reflecting on the results and on the principles of parsimony confirm that "a lot" is perhaps a limitation. However, having said that, this study was meant to be an exploratory study and so "a lot" could also in this instance have some benefits, i.e., this study yielded results that merely gloss over the surface of this topic but nonetheless contribute to existing knowledge by suggesting three overarching themes:

1. The role of leadership in driving the use of workplace settings as an organisational resource: Perhaps more important than the direct effects of workplace settings on the satisfaction of psychological needs is the role leaders play in determining how workplace settings are used as a resource to help facilitate the satisfaction of needs (e.g., work arrangements defined by the leaders, how workplace settings are used according to the organisational culture defined by leaders, etc.).
2. Individuals' preferences lead individuals to appreciate different workplace settings in different ways: What might contribute to a satisfaction of needs for one person might not contribute to a satisfaction of needs for another. Also, at the end of the day, a workplace setting is for the people, and it is not the people who are for the workplace setting, and so what matters is how individuals and groups decide to use different workplace settings regardless of the intended purpose of these different spaces.

3. The influence of normalisation of new work arrangements on the relationship between workplace settings and psychological needs: The norm pre-Covid was to go to the office to work. During Covid, organisations and employees had to learn how to continue operating with everyone working from different places. Post-Covid, flexible work arrangements (i.e., working from different places) continued. This could have led to the adoption of strategies to still satisfy psychological needs from any workplace setting making where someone works from less of a concern.

The hope is that findings from this research gives future researchers insight on how best to approach the topic of workplace settings. In particular, it might be useful to limit the scope to, for example, just one type of workplace setting, or perhaps just one of the three psychological needs, to allow room to dive deeper into the variables of concern without making the study too big and broad. It would also be recommended that future research be more discriminate about what variables to include, and then upon deciding what variables to include, it is advised that careful consideration be given to how the different variables are measured.

Conclusion

In conclusion, an existing basic self-determination theory model in the workplace illustrates that leadership style, occupational characteristics and individual factors contribute to the satisfaction of psychological needs, which then leads to employee well-being as well as employees being autonomously motivated to contribute to organisational goals (Deci et al., 2017). This study aimed to examine whether the physical environment, i.e., workplace settings, also contributes to the satisfaction of psychological needs in the same way that leadership style, occupational characteristics and individual factors do. Findings of this research suggested that workplace settings do not make a strong enough contribution to predicting the satisfaction of psychological needs.

Rather than workplace settings, a leadership style that facilitates the satisfaction of psychological needs, such as engaging leadership, might be enough to facilitate the

satisfaction of needs. Occupational characteristics also potentially contribute to the satisfaction of psychological needs more than workplace settings. In particular, professional level appears to be a significant factor; other job-related factors not included in the design of this study, such as perception of job relevance and availability of relevant tools, could also contribute to the satisfaction of psychological needs, putting less reliance on workplace setting. Individual factors like age could also possibly contribute more than workplace settings to the satisfaction of psychological needs, though age did not have significant main effects in this study. In addition, there are other individual factors, such as culture and personal preferences, that could be significant but were not captured during data collection, and which helps explain why this study failed to find significant findings.

Finally, it is important to note that a time of re-negotiation of norms and of change can be disruptive and can highlight certain factors. Workplace settings is an example of an organisational factor that was surfaced to the forefront because of the Covid-19 pandemic (Kant & Norman, 2021). But eventually, new norms are normalised and when it does, individuals develop adaptation strategies, and so what might once have been a source of stress eventually becomes something individuals become habituated to. This could be the case with the timing of this study and why associations between workplace settings and the satisfaction of psychological needs were not significant.

Thus, in summary, contrary to what was proposed, which was to add workplace setting to the basic self-determination theory model in the workplace presented by Deci et al. (2017), findings showed that adding workplace settings to the model is perhaps unnecessary. However, it doesn't mean that workplace settings are irrelevant, especially considering that workplace settings were found to have a significant association with the satisfaction of autonomy even while controlling for engaging leadership and work-related factors. Further research is recommended to extend this study by refining the research design and to also look at potential interaction effects between workplace settings and the variables that already exist in the basic self-determination theory model in the workplace.

References

Aarts, K. (2007). Parsimonious methodology. *Methodological Innovations Online, 2*(1), 2–10. https://doi.org/10.4256/mio.2007.0002

Ahrentzen, S. (1989). A place of peace, prospect, and...a P.C.: The home as office. *Journal of Architectural and Planning Research, 6*(4), pp. 271–288. https://www.jstor.org/stable/43028933

Andrews, E. L. (2021, June 03). The pandemic blew up the American office – For better and worse. *Inside Stanford Business.* https://www.gsb.stanford.edu/insights/pandemic-blew-american-office-better-worse

Ayoko O. B., & Härtel, C. E. J. (2003). The role of space as both a conflict trigger and a conflict control mechanism in culturally heterogenous workgroups. *Applied Psychology: An International Review, 52*(3), 838–412. https://doi.org/10.1111/1464-0597.00141

Boge, K., Salaj, A. T., Bakken, I., Granli, M., & Mandrup, S. (2019). Knowledge workers deserve differentiated offices and workplace facilities. *Facilities, 37*(1/2), 38–60. https://doi.org/10.1108/F-01-2018-0002

BOS. (n.d.) *Bürolandschaft*. https://www.bos.com/inspired/burolandschaft/

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., Duriez, B., Lens, W., Matos, L., Mouratidis, A., Ryan, R. M., Sheldon, K. M., Soenens, B., Van Petegem, S., & Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation Emotion*, *39*, 216–236. https://doi.org/10.1007/s11031-014-9450-1

Chevez, A., & Huppatz, DJ. (2017, August 14). *A short history of the office*. The Conversation. https://theconversation.com/a-short-history-of-the-office-82000

Crouch, A., & Nimran, U. (1989). Office design and the behavior of senior managers. *Human Relations, 42*(2), 139–155. https://doi.org/10.1177/001872678904200203

Dahling, J. J., & Lauricella, T. K. (2017). Linking job design to subjective career success: A test of self-determination theory. *Journal of Career Assessment, 25*(3), 371–388. https://doi.org/10.1177/1069072716639689

Danielsson, C. B., Wulff, C., & Westerlund, H. (2013). Is perception of leadership influenced by office environment? *Journal of Corporate Real Estate, 15*(3/4), 194–292. https://doi.org/10.1108/JCRE-03-2013-0008

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. Springer.

Deci, E. L., Olafsen, A. H., & Ryan, R. M. (2017). Self-determination theory in work organisations: The state of a science. *The Annual Review of Organizational Psychology and Organizational Behavior, 4*, 19–43. https://doi.org/10.1146/annurev-orgpsych-032516-113108

Epstein, R. (1984) The principle of parsimony and some applications in psychology. *The Journal of Mind & Behavior, 5*(2), 119–130. https://www.researchgate.net/publication/266883461

Foertsch, C., & Voll, J. (2022, February 17). *Coworking Space Business Trends*. https://www.deskmag.com/en/coworking-news/2022-results-of-the-coworking-space-business-trends-survey

Gagné, M., & Deci, E. L. (2014). The history of self-determination theory in psychology and management. In Gagné, M. (Ed.), *The Oxford handbook of work engagement, motivation, and self-determination theory* (pp. 1–9). Oxford University Press.

Gagné, M., & Panaccio, A. (2014). The motivational power of job design. In Gagné, M. (Ed.), *The Oxford handbook of work engagement, motivation, and self-determination theory* (pp. 165–180). Oxford University Press.

Gajendran, R. S., Harrison, D. A., & Delaney-Klinger, K. (2015). Are telecommuters remote good citizens? Unpacking telecommuting's effects on performance via i-deals and job resources. *Personnel Psychology, 68*(2), 353–393. https://doi.org/10.1111/peps.12082

Gao, S., Low, S. P., & Gong, H. Q. (2022). Effects of activity-based workspaces on employee belongingness. *Facilities, 40*(1/2), 98–117. https://doi.org/10.1108/F-08-2020-0093

Gibson, C. B., Gilson L. L, Griffith, T. L., & O'Neil, T. A. (2023). Should employees be required to return to the office? *Organizational Dynamics, 52*(2), 1–11. https://doi.org/10.1016/j.orgdyn.2023.100981

Graßmann, C., & Decius, J. (2023). Self-development in the twenty-first century: An exploratory analysis of the relationship between new work characteristics and informal workplace learning. *Gruppe. Interaktion. Organisation. (GIO), 54*, 289–299. https://doi.org/10.1007/s11612-023-00702-8

Graduate Studies. (2019). Motivation in the workplace. In *Organisational Behaviour* [Custom Textbook] (pp. 301–382). Custom publication for MGMT805 – Organizational Behavior course, Granite State College. https://granite.pressbooks.pub/mgmt805/chapter/why-it-matters-motivation-in-the-workplace/

Great Britain Parliament House of Commons. (1856). *Parliamentary papers – Reports from committees: 1856 – Eleven volumes: Contents of the eighth volume* (Vol. 14). H.M. Stationery Office. https://www.google.co.nz/books/edition/Parliamentary_Papers/4KwSAAAAYAAJ?hl=en&gbpv=0

Greenaway, K. H., Thai, H. A., Haslam, S. A., & Murphy S. C. (2016). Spaces that signal identity improve workplace productivity. *Journal of Personnel Psychology, 15*(1), 35–43. https://doi.org/10.1027/1866-5888/a000148

Gripenstraw, K., & Saini, A. N. (2020, July 15). A brief history of the modern office. *Harvard Business Review*. https://hbr.org/2020/07/a-brief-history-of-the-modern-office?ab=seriesnav-bigidea

Gubler, T., Larkin, I., & Pierce, L. (2016). Motivational spillovers from awards: Crowding out in a multitasking environment. *Organisation Science, 27*(2), 286–303. https://doi.org/10.1287/orsc.2016.1047

Hecht, H., Welsch, R., Viehoff, J., & Longo, M. R. (2019). The shape of personal space. *Acta Psychologica, 193*, 113–122. https://doi.org/10.1016/j.actpsy.2018.12.009

Hickey, S. (2015, October 15). The history of the office – why open-plan fell out of fashion. *The Guardian*. https://www.theguardian.com/small-business-network/2015/oct/15/history-office-open-small-business-workplaces

Kant, L., & Norman, E. (2021). Working under the gun: A theoretical analysis of stressors associated with the re-negotiation of norms and control of work tasks during COVID-19. *Frontiers in Psychology, 12*, Article 577769. https://doi.org/10.3389/fpsyg.2021.577769

Kudyba, S. (2020). COVID-19 and the acceleration of digital transformation and the future of work. *Information Systems Management, 37*(4), 284–287. https://doi.org/10.1080/10580530.2020.1818903

Lataster, J., Reijnders, J., Janssens, M., Simons, M., Peeters, S., & Jacobs, N. (2022). Basic psychological need satisfaction and well-being across age: A cross-sectional general population study among 1709 Dutch speaking adults. *Journal of Happiness Studies, 23*(5), 2259–2290. https://doi.org/10.1007/s10902-021-00482-2

Lee, S. Y. & Brand, J. L. (2005). Effects of control over office workspace on perceptions of the work environment and work outcomes. *Journal of Environmental Psychology, 25*(3), 323–333. https://doi.org/10.1016/j.jenvp.2005.08.001

Lin, H-F. (2007). Effects of extrinsic and intrinsic motivation on employee knowledge sharing intentions. *Journal of Information Science, 33*(2), 135–149. https://doi.org/10.1177/0165551506068174

Marquardt, G., Cross, E. S., deSousa, A. A., Edelstein, E., Farnè, A., Leszczynski, M., Patterson, M., & Quadflieg, S. (2015). There or not there? A multidisciplinary review and research agenda on the impact of transparent barriers on human perception, action, and social behavior. *Frontiers in Psychology, 6*, Article 1381. https://doi.org/10.3389/fpsyg.2015.01381

Mazmanian, M., Orlikowski, W. J., Yates, J. (2013). The autonomy paradox: The implications of mobile email devices for knowledge professionals. *Organization Science 24*(5), 1337–1357. http://doi.org/10.1287/orsc.1120.0806

McCusker, J. A. (2002). *Individuals and open space office design: The relationship between personality and satisfaction in an open space work environment* (Publication No. 3043480) [Doctoral dissertation, Alliant International University]. ProQuest Dissertations and Theses Global.

Nickl, R. (n.d.). *Activity-Based Workplace*. SpaceIQ. https://spaceiq.com/blog/activity-based-workplace-design/

Oldham, G. R. (1998). Effects of changes in workspace partitions and spatial density on employee reactions: A quasi-experiment. *Journal of Applied Psychology, 73*(2), 253–258. https://doi.org/10.1037/0021-9010.73.2.253

Ostendoft, D. M., Schmiege, S. J., Conroy, D. E., Phelan, S., Bryan, A. D., & Catenacci, V. A. (2021). Motivational profiles and change in physical activity during a weight loss intervention: A secondary analysis. *International Journal of Behavioral Nutrition and Physical Activity, 18*, Article 158. https://doi.org/10.1186/s12966-021-01225-5

Petri, H. L. & Cofer, C. N. (2023). Motivation. In *Encyclopedia Britannica*. https://www.britannica.com/topic/motivation

Prasad, K. D. V., & Mangipudi, M. R. (2021). A general linear model approach: Development of psychological well-being, remote working, employee engagement, job satisfaction, scales, data analysis and reporting concerning to information technology sector. *Journal of Contemporary Issues in Business and Government, 27*(1), 1006–1035.

Rahmadani, V. G., & Schaufeli, W. B. (2020). Engaging leadership and work engagement as moderated by “diuwongke”: An Indonesian study. *The International Journal of Human Resource Management, 33*(7), 1267–1295. https://doi.org/10.1080/09585192.2020.1799234

Rahmadani, V. G., Schaufeli, W. B., & Stouten, J. (2020). How engaging leaders foster employees' work engagement. *Leadership & Organization Development Journal, 41*(8), 1155–1169. https://doi.org/10.1108/LODJ-01-2020-0014

Rawling, C. (2022). *Hybrid working: Is it the future of employment?* NewsHub. https://www.newshub.co.nz/home/lifestyle/2022/06/hybrid-working-is-it-the-future-of-employment.html

Rigby, C. S., & Ryan, R.M. (2018). Self-determination theory in human resource development: New directions and practical considerations. *Advances in Developing Human Resources, 20*(2), 133–147. https://doi.org/10.1177/1523422318756954

Ross, C. E., & Reskin, B. F. (1992). Education, control at work, and job satisfaction. *Social Science Research 21*(2), 134–148. https://doi.org/10.1016/0049-089X(92)90012-6

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Sailer, K., Koutsolampros, P., & Pachilova, R. (2021). Differential perceptions of teamwork, focused work and perceived productivity as an effect of desk characteristics within a workplace layout. *PLOS ONE, 16*(4), Article e0250058. https://doi.org/10.1371/journal.pone.0250058

Schaufeli, W. B. (2015). Engaging leadership in the job demands-resources model. *Career Development International, 20*(5), 446–463. https://doi.org/10.1108/CDI-02-2015-0025

Schlosser, J. (2006). Cubicles: The great mistake. *Fortune Magazine.* https://money.cnn.com/2006/03/09/magazines/fortune/cubicle_howiwork_fortune/index.htm

Sheldon, K. M., & Filak, V. (2008). Manipulating autonomy, competence, and relatedness support in a game-learning context: New evidence that all three needs matter. *British*

Journal of Social Psychology, 47(2), 267–283. https://doi.org/10.1348/014466607X238797

Steers, R.M., Mowday, R. T., & Shapiro, D. L. (2004). Introduction to special topic forum: The future of work motivation theory. *Academy of Management Review, 29*(3), 379–387. https://doi.org/10.2307/20159049

Taylor, F. W. (1998). *The principles of scientific management*. Engineering & Management Press. (Original work published 1911).

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review, 117*(2), 440–463. https://doi.org/10.1037/a0018963

Vagnoni, E., Lewis, J., Tajadura-Jiménez, A., & Cardini, F. (2018). Listening to a conversation with aggressive content expands the interpersonal space. *PLOS ONE, 13*(3), Article e0192753. https://doi.org/10.1371/journal.pone.0192753

Van den Broeck, A., Vansteenkiste, M., De Witte, H., Soenens, B., & Lens, W. (2010). Capturing autonomy, competence, and relatedness at work: Construction and initial validation of the work-related basic need satisfaction scale. *Journal of Occupational and Organizational Psychology, 83*(4), 981–1002. https://doi.org/10.1348/096317909X481382

van Hoof, M. L. M., & De Pater, I. E. (2019). Daily associations between basic psychological need satisfaction and well-being at work: The moderating role of need strength. *Journal of Occupational and Organizational Psychology, 92*(4), 1027–1035. https://doi.org/10.1111/joop.12260

van Tuin, L., Schaufeli, W. B., & Van den Broeck, A. (2021). Engaging leadership: Enhancing work engagement through intrinsic values and need satisfaction. Human Resource Development Quarterly, 1–23. https://doi.org/10.1002/hrdq.21430

van Tuin, L., Schaufeli, W. B., van Rhenen W., & Kuiper R. M. (2020). Business results and well-being: An engaging leadership intervention study. *International Journal of*

Environmental Research and Public Health, 17(12), 1–18. https://doi.org/10.3390/ijerph17124515

Vischer, J. C. (2007a). The concept of workplace performance and its value to managers. *California Management Review, 49*(2), 62–79. https://doi.org/10.2307/41166383

Vischer, J. C. (2007b). The effects of the physical environment on job performance: Towards a theoretical model of workspace stress. *Stress and Health, 23*(3), 175–184. https://doi.org/10.1002/smi.1134

Vischer, J.C., & Wifi, M. (2017). The effect of workplace design on quality of life at work. In: G. Fleury-Bahi, E. Pol, & O. Navarro (Eds.), *Handbook of Environmental Psychology and Quality of Life Research. International Handbooks of Quality-of-Life* (pp. 387–400). Springer. https://doi.org/10.1007/978-3-319-31416-7_21

Welsch, R., von Castel, C., & Hecht, H. (2019). The anisotropy of personal space. *PLOS ONE, 14*(6), Article e0217587. https://doi.org/10.1371/journal.pone.0217587

Weziak-Białowolska, D., Dong, Z., & McNeely, E. (2018). Turning the mirror on the architects: A study of the open-plan office and work behaviors at an architectural company. *Frontiers in Psychology, 9,* Article 2178. https://doi.org/10.3389/fpsyg.2018.02178

Appendix A

Question for Workplace Setting

Select the workplace setting that best describes what you currently use the most during the course of your work?

- An enclosed single-person office (assigned only to me)
- An enclosed office shared with others
- A permanently assigned workstation or cubicle in an open plan space (assigned only to me)
- An open plan space permanently assigned to me and others (e.g., hot desk space in an open plan)
- A remote office (e.g., a home office)

Appendix B

Modified Work-related Basic Need Satisfaction Scale (W-BNS)

Think of your experiences while working from the (workplace setting).

While working from the (workplace setting)...

I feel like I can be myself.	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I often feel like I have to follow other people's commands. (R)	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
If I could choose, I would do things differently. (R)	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
The tasks I have to do are in line with what I really want to do.	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I feel free to do my job the way I think it could best be done.	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I feel forced to do things I do not want to do. (R)	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I don't really feel competent in my job. (R)	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I really master my tasks at my job.	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I feel competent at my job.	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I doubt whether I am able to execute my job properly. (R)	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I am good at the things I do in my job.	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I have the feeling that I can even accomplish the most difficult tasks in my job.	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I don't really feel connected with other people at my job. (R)	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I feel part of a group.	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I don't really mix with other people at my job. (R)	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I can talk with people about things that really matter to me.	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
I often feel alone when I am with my colleagues. (R)	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree
Some people I work with are close friends of mine.	Totally agree	Somewhat agree	Neutral	Somewhat disagree	Totally disagree

Note. An (R) at the end of the statement indicates items that need to be coded reversely.

Appendix C

Engaging Leadership Scale

For this question, think of your immediate line manager or supervisor in your current role. If you have more than one manager, think of the manager with whom you are most familiar with.

My manager/ supervisor…

encourages team members to develop their talents as much as possible	Completely agree	Somewhat agree	Neutral	Somewhat disagree	Completely disagree
delegates tasks and responsibilities to team members	Completely agree	Somewhat agree	Neutral	Somewhat disagree	Completely disagree
encourages team members to use their own strengths	Completely agree	Somewhat agree	Neutral	Somewhat disagree	Completely disagree
encourages collaboration among team members	Completely agree	Somewhat agree	Neutral	Somewhat disagree	Completely disagree
actively encourages team members to aim for the same goals	Completely agree	Somewhat agree	Neutral	Somewhat disagree	Completely disagree
promotes team spirit	Completely agree	Somewhat agree	Neutral	Somewhat disagree	Completely disagree
gives team members enough freedom and responsibility to complete their tasks	Completely agree	Somewhat agree	Neutral	Somewhat disagree	Completely disagree
encourages team members to give their own opinion	Completely agree	Somewhat agree	Neutral	Somewhat disagree	Completely disagree
recognises ownership of team member's contributions	Completely agree	Somewhat agree	Neutral	Somewhat disagree	Completely disagree

Appendix D

AUT Ethics Approval

Auckland University of Technology Ethics Committee (AUTEC)

Auckland University of Technology
D-88, Private Bag 92006, Auckland 1142, NZ
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

14 June 2022

Ying Wang
Faculty of Culture and Society

Dear Ying

Re Ethics Application: **22/139 Does space matter? An exploratory study of the effects of workplace settings on the needs for autonomy, competence, and relatedness**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 14 June 2025.

Standard Conditions of Approval

1. The research is to be undertaken in accordance with the Auckland University of Technology Code of Conduct for Research and as approved by AUTEC in this application.
2. A progress report is due annually on the anniversary of the approval date, using the EA2 form.
3. A final report is due at the expiration of the approval period, or, upon completion of project, using the EA3 form.
4. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form.
5. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.
6. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEC Secretariat as a matter of priority.
7. It is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard and that all the dates on the documents are updated.
8. AUTEC grants ethical approval only. You are responsible for obtaining management approval for access for your research from any institution or organisation at which your research is being conducted and you need to meet all ethical, legal, public health, and locality obligations or requirements for the jurisdictions in which the research is being undertaken.

Please quote the application number and title on all future correspondence related to this project.

For any enquiries please contact ethics@aut.ac.nz. The forms mentioned above are available online through http://www.aut.ac.nz/research/researchethics

(This is a computer-generated letter for which no signature is required)

The AUTEC Secretariat
Auckland University of Technology Ethics Committee

Cc: jhq3815@autuni.ac.nz; andreagocu@gmail.com

Appendix E

Participant Information Sheet

DOES SPACE MATTER? AN EXPLORATORY STUDY OF THE EFFECTS OF WORKPLACE SETTINGS ON THE NEEDS FOR AUTONOMY, COMPETENCE AND RELATEDNESS

Participant Information Sheet

Date Information Sheet Produced: 1 October 2022

Project Title: Does space matter? An exploratory study of the effects of workplace settings on the needs for autonomy, competence, and relatedness

An introduction and invitation:
I, Andrea Cu, am a Master of Arts student majoring in Psychology and am conducting this research as part of the requirements of the qualification. I'd like to invite you to participate in this research investigating the impacts of workplace settings on psychological needs. Participation in this research is completely voluntary and there will be no consequences for opting out.

What is the purpose of this research?
Existing research tells us that where we work influences employee behaviours (e.g., social interactions between colleagues, productivity, etc.) and also affects employee wellbeing, but it is not clear how or why workplace settings make a difference. This research aims to establish whether workplace settings impact our needs to feel competent and autonomous in our job and to feel connected to our colleagues, which are what lead to positive behaviours and wellbeing at work. The findings of this research may be used for academic publications and presentations.

How was I identified and why am I being invited to participate in this research?
This research seeks out people who are willing to contribute 5-10 minutes of their time to answer an online survey. In addition, to participate in this research, you must meet both of the following criteria:

- You must be at least 16 years old, and
- You must currently be employed doing an office/desk job either part or all of the time during the course of your work.

How do I agree to participate in this research?
Your participation in this research is voluntary (it is your choice) and whether or not you choose to participate will neither advantage nor disadvantage you. You will be able to withdraw from the study at any time before you submit your responses at the end of the survey. However, once you reach the end and submit your answers, removal of your data may not be possible. Choosing to take part and complete the survey indicates consent to participate in this research. You may click on the next button at the end of this Participant Information Sheet to continue on to the survey.

What will happen in this research?
You will be asked to complete a series of short questionnaires to collect the following information:

- Your work-related demographics,
- One type of workplace setting you work in the most, which will be your frame of reference for the rest of the survey,
- A scale that measures the leadership style of your line manager,
- A scale that measures how autonomous and competent you feel while working from your nominated workplace setting, and
- A scale that measures your sense of belongingness/ relatedness while working from your nominated workplace setting.

Answering the questionnaires should take approximately 5-10 minutes to complete. All information will be anonymous.

Participants who complete the survey will be eligible to be part of a raffle draw to win one out of 25 Mighty Ape gift cards (either one out of two NZD$100 gift cards; one out of three NZD$50 gift cards; or one out of twenty NZD$25 gift cards) redeemable at https://www.mightyape.co.nz/. Participants who do not complete the survey or who do not meet the inclusion criteria will not be eligible for the raffle. It is completely voluntary to be part of the raffle. Participants who choose to be part of the raffle will be asked to provide contact information. Contact information gathered for the raffle will not be associated in any way to any of the earlier questionnaires you answered.

What are the discomforts and risks?
The questionnaires will ask you to score your manager's leadership style, and also score how you feel about different scenarios while working from a particular workplace setting. It is expected that you will not be exposed to discomforts or risks outside of what you would be exposed to in your daily life. Please remember that participation in this study is entirely voluntary (your choice). If you feel uncomfortable at any time during the survey and you wish to stop, you are free to do so without providing a reason.

What are the benefits?
Findings from this research could help you inform decisions on work arrangements as countries come out of COVID-19 and you and your organisation navigate your way around what life after COVID-19 will be like. Also, your participation in this research will contribute towards the completion of my Master of Arts degree.

How will my privacy be protected?
In this questionnaire you will not be asked to provide contact details or information that might identify you, and the survey platform, Qualtrics, does not collect IP addresses. Upon completion of the survey, you will have the option to be part of a raffle draw to win a gift card. To enable me to send you your gift card, you will need to provide contact details, but these details will not be linked to your survey responses, which remain anonymous.

What are the costs of participating in this research?
Completing this questionnaire should take approximately 5-10 minutes of your time. There are no other costs involved.

What opportunity do I have to consider this invitation?
Please take you time to consider participating in this study. The survey will be available until 31 January 2023.

Will I receive feedback on the results of this research?
A summary of the findings will be made available to you through this URL: https://tinyurl.com/thesisdoesspacematter. This URL will need to be saved until the findings become available during the first quarter of 2024.

What do I do if I have concerns about this research?
Any concerns regarding the nature of this project should be notified in the first instance to my primary research supervisor, Dr Ying Wang (email: y.wang@aut.ac.nz; telephone (+649) 921 9999 extension 5012).

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEC (email: ethics@aut.ac.nz; telephone (+649) 921 9999 extension 6038).

Who do I contact for further information about this research?
Please keep information from this Participant Information Sheet for your future reference. You are able to contact the research team as follows:

Researcher Contact Details: Andrea Cu (email: jhq3815@autuni.ac.nz)
Primary Research Supervisor Contact Details: Dr Ying Wang (email: y.wang@aut.ac.nz; telephone (+649) 921 9999 extension 5012)

Approved by the Auckland University of Technology Ethics Committee on 14 June 2022, AUTEC Reference number 22/139.

Have you read, and do you understand, all the information provided in this Participant Information Sheet?

○ Yes ○ No

Appendix F

Descriptive Analysis of the Satisfaction of the Need for Autonomy

	Autonomy (*N* = 374)		
	n	*M*	*SD*
Gender			
Male	189	3.49	0.68
Female	177	3.50	0.74
Gender diverse	6	3.39	0.86
Prefer not to say	2	3.17	0.94
Education			
Primary/ Secondary	33	3.70	0.53
Diploma	37	3.56	0.76
Bachelors degree	204	3.43	0.71
Master's degree	80	3.46	0.75
Doctoral degree	20	3.79	0.65
Professional level			
Labourer/ Tradespeople	14	3.33	0.20
Administrator/ Coordinator/ Office Staff	99	3.31	0.80
Technical Staff/ Professional Occupation	144	3.49	0.65
Manager	75	3.58	0.70
Senior Leadership	41	3.77	0.71
Other	1	5.00	-
Employment type			
Permanent full time	270	3.52	0.72
Permanent part-time	39	3.50	0.76
Fixed-term full time	28	3.60	0.49
Fixed-term part-time	20	3.37	0.81
Hourly paid	17	3.53	0.73
Industry			
Administrative and Support Services	22	3.24	0.80
Construction	11	3.35	0.82
Education and Training	34	3.59	0.66
Financial and Insurance Services	30	3.61	0.53
Health Care and Social Assistance	32	3.42	0.90
Information Media, Telecommunication and Information Technology	81	3.62	0.69
Manufacturing	25	3.39	0.63
Professional, Scientific and Technical Services	41	3.49	0.75
Public Administration and Safety	21	3.30	0.83
Retail Trade	29	3.62	0.60
Accommodation and Food Services & Rental, Hiring and Real Estate Services	13	3.26	0.56
Agriculture, Forestry and Fishing & Electricity, Gas, Water and Waste Services & Mining	13	3.64	0.91
Transport Postal and Warehousing & Wholesale Trade	11	3.52	0.46
Arts and Recreation Services & Other	11	3.14	0.59

Appendix G

Analysis of Covariance in the Satisfaction of the Need for Autonomy

	df	Unadjusted			Adjusted – Model1[a]			Adjusted – Model2[b]			Adjusted – Model3[c]		
		F	*p*	η_p^2	*F*	*p*	η_p^2	*F*	*p*	η_p^2	*F*	*p*	η_p^2
Autonomy													
Workplace setting	4	6.663	<.001	.067	4.970	<.001	.051	2.388	.051	.027	1.835	.122	.021
Engaging Leadership	1				67.517	<.001	.155	73.132	<.001	.175	74.686	<.001	.182
Tenure	1							0.001	.972	.000	0.008	.928	.000
Experience	1							7.508	.006	.021	0.538	.464	.002
Professional Level	5							3.004	.011	.042	3.296	.006	.047
Employment Type	4							1.085	.364	.012	0.879	.476	.010
Industry	13							0.616	.841	.023	0.732	.731	.028
Gender	3										0.230	.875	.002
Age	1										0.548	.460	.002
Education	4										2.630	.034	.030

[a]Model 1 includes the covariate Engaging Leadership. [b]Model 2 includes the covariates Engaging Leadership, Tenure and Experience, and other work-related variables. [c]Model 3 includes the covariates Engaging Leadership, Tenure, Experience and Age, and personal demographics.

Appendix H

Descriptive Analysis of the Satisfaction of the Need for Competence

	Competence (*N* = 374)		
	n	*M*	*SD*
Gender			
Male	189	4.05	0.68
Female	177	4.05	0.67
Gender diverse	6	3.52	0.86
Prefer not to say	2	3.60	0.57
Education			
Primary/ Secondary	33	4.11	0.72
Diploma	37	4.07	0.67
Bachelors degree	204	3.99	0.67
Master's degree	80	4.03	0.73
Doctoral degree	20	4.46	0.45
Professional level			
Labourer/ Tradespeople	14	3.94	0.47
Administrator/ Coordinator/ Office Staff	99	3.92	0.71
Technical Staff/ Professional Occupation	144	4.00	0.72
Manager	75	4.22	0.56
Senior Leadership	41	4.17	0.65
Other	1	5.00	-
Employment type			
Permanent full time	270	4.10	0.67
Permanent part-time	39	4.16	0.65
Fixed-term full time	28	3.62	0.62
Fixed-term part-time	20	3.78	0.81
Hourly paid	17	3.93	0.57
Industry			
Administrative and Support Services	22	3.92	0.75
Construction	11	3.70	0.68
Education and Training	34	4.12	0.61
Financial and Insurance Services	30	4.14	0.67
Health Care and Social Assistance	32	4.24	0.48
Information Media, Telecommunication and Information Technology	81	4.04	0.72
Manufacturing	25	4.07	0.57
Professional, Scientific and Technical Services	41	4.03	0.81
Public Administration and Safety	21	4.02	0.72
Retail Trade	29	4.17	0.59
Accommodation and Food Services & Rental, Hiring and Real Estate Services	13	3.68	0.77
Agriculture, Forestry and Fishing & Electricity, Gas, Water and Waste Services & Mining	13	4.05	0.54
Transport Postal and Warehousing & Wholesale Trade	11	4.08	0.44
Arts and Recreation Services & Other	11	3.59	0.89

Appendix I

Analysis of Covariance in the Satisfaction of the Need for Competence

	df	Unadjusted			Adjusted – Model1[a]			Adjusted – Model2[b]			Adjusted – Model3[c]		
		F	*p*	η_p^2	*F*	*p*	η_p^2	*F*	*p*	η_p^2	*F*	*p*	η_p^2
Competence													
Workplace setting	4	0.748	.560	.008	0.638	.635	.007	0.125	.974	.001	0.200	.938	.002
Engaging Leadership	1				15.945	<.001	.042	21.190	<.001	.058	21.511	<.001	.060
Tenure	1							0.715	.398	.002	0.549	.459	.002
Experience	1							16.813	<.001	.047	1.472	.226	.004
Professional Level	5							1.754	.122	.025	1.728	.128	.025
Employment Type	4							1.680	.154	.019	1.670	.157	.019
Industry	13							0.850	.607	.031	0.808	.652	.030
Gender	3										0.974	.405	.009
Age	1										2.755	.098	.008
Education	4										1.074	.369	.013

[a]Model 1 includes the covariate Engaging Leadership. [b]Model 2 includes the covariates Engaging Leadership, Tenure and Experience, and other work-related variables. [c]Model 3 includes the covariates Engaging Leadership, Tenure, Experience and Age, and personal demographics.

Appendix J

Descriptive Analysis of the Satisfaction of the Need for Relatedness

	Relatedness (*N* = 374)		
	n	*M*	*SD*
Gender			
Male	189	3.58	0.74
Female	177	3.55	0.80
Gender diverse	6	2.86	1.14
Prefer not to say	2	4.25	0.59
Education			
Primary/ Secondary	33	3.62	0.65
Diploma	37	3.47	0.74
Bachelors degree	204	3.59	0.79
Master's degree	80	3.54	0.82
Doctoral degree	20	3.39	0.75
Professional level			
Labourer/ Tradespeople	14	3.54	0.77
Administrator/ Coordinator/ Office Staff	99	3.40	0.75
Technical Staff/ Professional Occupation	144	3.46	0.79
Manager	75	3.79	0.74
Senior Leadership	41	3.86	0.75
Other	1	4.00	-
Employment type			
Permanent full time	270	3.62	0.79
Permanent part-time	39	3.52	0.85
Fixed-term full time	28	3.21	0.47
Fixed-term part-time	20	3.44	0.87
Hourly paid	17	3.32	0.61
Industry			
Administrative and Support Services	22	3.55	0.69
Construction	11	3.29	0.95
Education and Training	34	3.77	0.63
Financial and Insurance Services	30	3.84	0.63
Health Care and Social Assistance	32	3.58	0.76
Information Media, Telecommunication and Information Technology	81	3.57	0.80
Manufacturing	25	3.47	0.72
Professional, Scientific and Technical Services	41	3.41	0.86
Public Administration and Safety	21	3.47	0.80
Retail Trade	29	3.87	0.70
Accommodation and Food Services & Rental, Hiring and Real Estate Services	13	3.15	0.71
Agriculture, Forestry and Fishing & Electricity, Gas, Water and Waste Services & Mining	13	3.31	0.92
Transport Postal and Warehousing & Wholesale Trade	11	3.79	0.62
Arts and Recreation Services & Other	11	2.92	0.89

Appendix K

Analysis of Covariance in the Satisfaction of the Need for Relatedness

	df	Unadjusted			Adjusted – Model1[a]			Adjusted – Model2[b]			Adjusted – Model3[c]		
		F	*p*	η_p^2	*F*	*p*	η_p^2	*F*	*p*	η_p^2	*F*	*p*	η_p^2
Relatedness													
Workplace setting	4	1.168	.324	.013	1.076	.368	.012	1.514	.198	.017	0.978	.419	.012
Engaging Leadership	1				52.587	<.001	.125	51.268	<.001	.130	52.194	<.001	.134
Tenure	1							1.275	.260	.004	1.126	.289	.003
Experience	1							2.672	.103	.008	0.577	.448	.002
Professional Level	5							3.418	.005	.047	3.327	.006	.047
Employment Type	4							0.607	.658	.007	0.589	.671	.007
Industry	13							1.289	.217	.046	1.278	.224	.047
Gender	3										1.244	.294	.011
Age	1										0.103	.749	.000
Education	4										1.230	.298	.014

[a]Model 1 includes the covariate Engaging Leadership. [b]Model 2 includes the covariates Engaging Leadership, Tenure and Experience, and other work-related variables. [c]Model 3 includes the covariates Engaging Leadership, Tenure, Experience and Age, and personal demographics.