Focused Immersion: When Do Information Technology Affordances Disrupt It?

Full Paper

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Abstract

The rise of the use of Information Technology (IT) in many activities throughout people's lives has led to questions about the impact on our attention. While most studies in this area have examined the role of task-specific technology, we still know little about the broader role of IT in people's environments. In this study, we examine how and when exposure to technology affordances, such as having a smartphone at hand, affects focused immersion in a task. Based on theory on construal levels, and confirmed by our study, we posit that higher level, abstract ways of thinking protect against the negative impact of IT affordances on focused immersion. This insight can potentially help individuals tailor their IT environments to their needs for a deeper engagement in their activities. Further, by connecting strands of literature on focused immersion, this work can facilitate the development of a more comprehensive theory of focused immersion.

Keywords: focused immersion, cognitive absorption, affordances, construal level, self-control, IT environment, experiment, attention

1. INTRODUCTION

As Information Technology (IT) continues to permeate people's work environment, it changes how people direct their attention. In 2010, the average American adult spent 7.6 hours per day on screens; by late 2018, this figure had climbed to over 10 hours (Meeker 2015; Nielsen 2019). Accounting for an average of 6.8 hours of sleep per day (Jones 2013), IT is used for more than half of their waking hours. Clearly, IT – and the activities it is used for – attract more of our attention in our daily lives than anything else.

Exactly how it does so is less clear: does it help users immerse in their activities with focus or does it fragment their attention? On the one hand, IT can aid our attention toward a focal task or activity. Take video games as an example: they can be so immersive that many users can play for hours on end, without interruption (Chan and Rabinowitz 2006). Similarly, the availability of video on demand has allowed for a growing phenomenon of binge-watching (Jenner 2017). Concentration on work-related activities may also benefit from IT. Multiple desktop, mobile, or web applications, like document editors, web browsers, and email applications, can operate together seamlessly and without delay to allow for a prolonged engagement in a given task or activity (Rettie 2001). Generally, many IT applications and devices are offered to 'facilitate processes', 'streamline journeys', or to bring 'intuitive experiences'. Indeed, IT can help users achieve a state of flow (Agarwal and Karahanna 2000; Pilke 2004).

On the other hand, as IT makes it easier to engage in many different activities at any time and place, could it make focusing on a given activity more difficult? With advances in working memory, multifunctional devices, and communication networks, IT has increasingly allowed for breaking down tasks and activities in time and resequencing the resulting fragments (Southerton 2006). Their visual, audible, and tactile stimuli, such as email notifications, incoming phone calls, reminders, and other alerts, are designed to capture our attention, and can trigger shifts in our attention across activities (Imbert et al. 2014). Similarly, through their own impulses and trains of thought, IT users themselves may trigger shifts in their attention, especially when afforded with many potential courses of action (Oulasvirta et al. 2012).

Various theories on motivation and the control of attentional resources posit that the selection of an object of attention is the outcome of evaluating multiple options (Friese et al. 2013; Oulasvirta et al. 2005; Steel 2007). Put simply, making one option more appealing means other options lose relative appeal, shifting the odds of option selection. By affording the user to play a game, text a friend, and check for email with only a click, tap, or swipe away, IT would, according to these theories, *undermine* our focused immersion.

Indeed, how often we shift our attention using technology seems to be on the rise. The literature on attention deficit disorder has reported a rising trend in the prevalence among adults (Fayyad et al. 2007; Giacobini et al. 2018), coinciding with growth of IT use. The literature on work-family conflict has shown that the boundary between these two spheres is blurring (Amstad et al. 2011), which is eased by IT (Turel et al. 2011). In a survey on the use of technology, eighteen percent of smartphone users said they check their mobile device once or more every ten minutes (Qualcomm, 2014). Such checking behavior is often quick, repetitive, and habitual (Oulasvirta et al. 2012).

So while IT can help us pay attention to an activity for a sustained period of time, it can also do the opposite. It can *help* our concentration and hurt it; it can engage users in their activities, and attract them to alternative uses of their time.

In this paper, we aim to shed light on this paradox. Through a lab experiment, we will examine certain technological and psychological conditions that can explain focused immersion. Since most studies have focused on task-relevant IT and ignored other IT in the environment, we will study how and when focused immersion in a task is affected by the IT affordances that are unrelated to that task. Examples of these *tangential IT affordances* are having a smartphone's functions at one's disposal or having many buttons visible on the screen that are irrelevant to a task on a desktop computer.

The psychological conditions we will examine are two levels of construal (Fujita et al. 2006). Based on the link between construal level and self-control, we develop the hypothesis that high (vs low) levels of construal protects against the potentially undermining effects of tangential IT affordances on focused immersion. This should help clarify if a high construal level helps us focus in distracting technological environments.

Our findings can potentially help designers and users of information technology to allow for more positive and productive experiences. It might help users shape their environment according to their changing needs to allow for more focused immersion, and its associated positive experiences of enjoyment, curiosity, and flow (Agarwal and Karahanna 2000). The findings of the study also inform further theory development.

2. CONCEPTUAL DEVELOPMENT

To develop our Hypotheses, we will first review focused immersion and its antecedents, and then discuss the roles of technology affordances and construal levels within that context.

2.1. Focused immersion

The concepts of attention, engagement, concentration, absorption, and immersion have all been used in interchangeably by some, and in distinct ways by others. They share a reference to a particular orientation of the mind toward an object, which can be any combination of external stimuli and an internal idea or thought. This mental orientation can remain stable over time or suddenly change over time. Research on attention and related concepts have used different time horizons (e.g. milliseconds, seconds, minutes, or longer), and delineated objects differently (Chun et al. 2011).

For our research, we follow the definition of focused immersion in Agarwal and Karahanna (2000, p673) as *the experience of total engagement where other attentional demands are, in essence, ignored*. We apply this to particular tasks or activities which can be defined on timescales of minutes and hours, rather than shorter or longer timescales such as seconds or days.

Group	Factors and antecedents of focused immersion and similar constructs
Traits of actor	Absorption has been linked to various **mental abilities** and **cognitive tendencies** (Agarwal and Karahanna 2000; Tellegen 1982; Tellegen and Atkinson 1974), including **self-control** and **mindfulness** (Mazzoni et al. 2017). Attention Deficit Hyperactivity Disorder (ADHD) has been linked with **genetics**, with many studies showing “a two- to eightfold increase in the risk for ADHD in parents and siblings of children with ADHD” (Biederman 2005, p1216). It has also been linked to **biological factors**, such as maternal smoking during pregnancy, and to **psychosocial factors** (e.g. family problems, maternal psychopathology) (Biederman 2005).
States of actor and their environment	**Mental effort** and other **self-control exertion** have been linked to decreased vigilance and effortful concentration (Hagger et al. 2010; Smit et al. 2004). **Low construal levels** have been linked to poorer self-control (Fujita et al. 2006). **Dominance of the hot (vs cool) system** has been linked to increased impulsivity (Hofmann et al. 2009; Metcalfe and Mischel 1999). **Sleepiness** and **fatigue** cause distractions in drivers (Bunn et al. 2005). **Opportunity constraints** limit the degree to which options for action are feasible, such as based on lack of time, money, or the presence of physical or social barriers (Hofmann and Kotabe 2012). **Salience of distracting stimuli** is a key factor in overt eye moments or covert shifts of attention (Carver and Scheier 2012; Taylor and Fiske 1978).
Characteristics of activity	Some tasks or activities are more immersive than others based on their inherent characteristics. In one study, factors of cognitive engagement in technology-mediated distance learning included the control, style, and attitude of the facilitator, as well as technical characteristics like **reliability, quality, richness** (Webster and Hackley 1997). In a study on a wheelchair simulator, factors included **the ability to change the field of view**, **the display type**, and **the visualization of the user’s avatar** (Alshaer et al. 2017). In another study, the **interactivity** of the task was found related to flow (Hoffman and Novak 1996). Certain **dynamic stimuli** on screens related to an activity were found guiding gaze (Rumpf et al. 2019).
Relationship between actor and activity	**Self-efficacy** in a task has been found to be an antecedent of cognitive absorption in that task (Agarwal and Karahanna 2000). **Balance between skill and challenge** in a task has been linked with flow in that task (Fullagar et al. 2013; Nakamura and Csikszentmihalyi 2014). **Perceived importance** of the activity and **achievement motive** were found moderating the impact of the skill/challenge balance on flow (Engeser and Rheinberg 2008). **Clear goals** and **immediate feedback** are characteristics of psychological flow (Csikszentmihalyi 1990). A user’s perception of a software program’s **flexibility** and **modifiability** were found to contribute to flow (Webster et al. 1993). The **strength of a desire** to engage in an alternative course of action predicts the likelihood of the desire’s enactment (Friese et al. 2013).

Table 1. Factors and antecedents of focused immersion and similar constructs related to the actor, activity, and the environment. The listed items are neither exhaustive nor mutually exclusive.

This construct of focused immersion and its related constructs like flow, cognitive absorption, and distraction have been studied in many disciplines with a wide range of findings. Table 1 presents various factors and antecedents of focused immersion and similar constructs. As a set, they are neither exhaustive nor mutually exclusive. While no theory exists on a comprehensive set of such factors, the Table presents a rough grouping of factors related to traits, states, the focal activity (or task), and the relationship between the activity and the actor.

Clearly, the predominant factors studied relate to the focal activity, the actor, and the relationship between the actor and the focal activity. The environment, such as the physical, technological, and social circumstances of an engagement, have received less attention, especially on the minute-to-hour timescale.

Research on the impact of technology has mostly focused on how technology used for a task helps determine focused immersion within that same task. For example, marketing studies have examined the role of particular features on a screen on gaze behavior (Rumpf et al. 2019) and studies on virtual reality have examined how technical properties related to the task at hand influence immersion (Alshaer et al. 2017). Some have studied the impact of notifications (Carroll et al. 2003; Imbert et al. 2014). Yet the availability of IT for alternative courses of action more broadly has not gained attention in the literature.

2.2. Technology Affordances

Our objective is to better understand the impact of exposure to tangential information technology affordances. In general, affordances are "properties of the world that are compatible with and relevant for people's interactions" (Gaver 1991, p79). For example, a door handle affords the user with the action of pulling or pushing a door open, and a messaging app affords the user with the action of sending a message to a friend. Affordances can be applied to any user-facing technology, and to tasks and activities at different levels of granularity, from typing a character to communicating with friends (Gaver 1991).

A user's *exposure* to affordances can help explain behaviour (De Guinea and Markus 2009; Gaver 1991). For example, someone writing a book with a typewriter is afforded with fewer action possibilities than someone writing it on a modern internet-connected computer. Their behaviour, including their focused immersion in the activity, can be radically different because of differences in exposure to affordances. Similarly, when a user places their smartphone in a handy location, they increase their exposure. The degree of exposure thus depends on the range of possibilities of actions and the costs in time and effort to start these actions.

The rise of mobile and desktop computers in many work environments has drastically increased exposure to IT affordances. Since these tools can be used for many activities it has particularly increased exposure to those affordances that are irrelevant to any given task. This is particularly noteworthy since task relevance of affordances seems critical in explaining the psychology of technology use (Addas and Pinsonneault 2018).

Tangential IT affordances allow for many alternative courses of action. Through habits and neural associations, their mental representations may trigger or catalyse the pre-processing of such courses of action and their execution, and help explain unintentional use of technology (De Guinea and Markus 2009; Hofmann et al. 2009). For example, thinking of a loved one in a story, a novelist will be more prone to sidetrack this train of thought with an impulse to, say, send their partner a message, when using a computer than when using a typewriter. We thus hypothesize the following:

H1: The exposure to tangential IT affordances during a task is negatively associated with focused immersion in that task.

Clearly, most of the time, most of the tangential IT affordances people are exposed to during a task do not cause disruption to their focus, since otherwise, focusing on any task using a computer would be unheard of. This raises the question of the conditions under which such exposure undermines focused immersion.

2.3. Construal Levels and Self-Control

Continuously engaging in an activity in the face of an impulse or desire to engage in an alternative course of action is quintessentially an act of self-control (De Ridder et al. 2012). Self-control has been studied as an individual's trait as some individuals exhibit more self-control than others, and also as a state, as people's self-control can fluctuate (Muraven and Baumeister 2000). Thus, could one's state of self-control explain when the exposure to tangential IT affordances undermine focus?

While we cannot directly measure self-control as a state, we can manipulate it. One way of doing so is by leveraging the link between construal levels and state self-control (Trope and Liberman 2010).

Construal levels are high and low levels of mental construals (Trope and Liberman 2010). High level construals are associated with abstract, strategic, big-picture thinking, whereas low level construals are associated with specific, detail-oriented, operational thinking. Construal levels are closely linked with self-control (Freitas et al. 2004; Fujita et al. 2006). Being able to see the forest beyond the trees will help with self-control, whereas attending to a specific impulse, and its immediate reward that might flow from it will undermine it. In other words:

> *In self-control conflicts, when one makes decisions or acts in accordance with the action tendency that is associated with high-level construals, one exerts self-control. In contrast, if one makes decisions or behaves in accordance with the action tendency associated with low-level construals, one experiences self-control failure.* (Fujita et al. 2006, p4)

Indeed, experiments have shown that asking a series of consecutive 'why' questions elicits high-level construals and better self-control, compared to asking a series of consecutive 'how' questions, which elicits low-level construals and worse self-control (Fujita et al. 2006). We thus hypothesize the following:

H2: The relation between the exposure of tangential IT affordances and focused immersion is stronger with low construal levels than with high construal levels.

3. METHODOLOGY

We employed a 2x2 cross-sectional laboratory experiment, using a student-based sample, to test our hypotheses. The main task in the experiment was to read a short article and write a reflective essay about it. The essay-writing task was chosen as a) it was similar to tasks that the participants could expect in their occupation, b) it required some degree of concentration, c) it was clearly delineated, and d) it was feasible to implement in a computer lab environment.

We manipulated exposure to tangential IT affordances by changing the visual computer interface and by having different smartphone policies. We manipulated construal levels by asking consecutive 'why' or 'how' questions, before they were introduced to the task (Freitas et al. 2004). After the task, participants answered questions, including those on focused immersion during the task. We employed ANOVA and multiple regression to test our hypotheses. Further details are given below.

3.1. Procedures

Through posters and digital posts, we invited students to participate in an experiment on "the effects of technology on behaviour," in return for a supermarket voucher. They were asked to choose a one-hour time-slot within a period of around two weeks, and come to the lab at the start of this hour. The administrator signed them off for administrative purposes only and the participants were ensured of their anonymity regarding their data. The administrator led them, quasi-randomly, to use one of five computers in either the left side of the room for low IT affordance, or one of five computers in the right side of the room for high IT affordance, such that we approximated a balance between the two conditions.[1] See Table 2 for the IT affordance manipulation.

Condition characteristics	**IT Affordance**	
	Low	**High**
Instruction about own devices	"During this study, please do not disturb anyone in the room. Please take out your smartphone and any other devices, switch them off, and put them back in your bag or pocket."	"During this study, please do not disturb anyone in the room."
Browser window	Full screen	Maximized but not full screen
Windows Taskbar	No taskbar visible	Taskbar with browser buttons
Firefox Bookmarks	No bookmarks visible	Some bookmarks visible, e.g. Facebook
News Article page for Essay task	The clean version contained no hyperlinks within article text, no links to other articles, and no ads.	The original version contained hyperlinks within article text, links to other articles, and ads.

Table 2: IT affordance manipulation

Participants were presented with an information sheet, asked to provide consent, and answer questions on demographics and control variables. At random, they were then presented with the low or high construal instrument (Freitas et al. 2004). After the construal level manipulation, participants were presented with an essay writing task. They were instructed to read a magazine article and to write their review. The article to review was published in *Wired Magazine,* on *Up Next*, an American initiative to send messages to students to help them prepare for college. Participants were asked to write why they thought it was a good or bad idea, and were given a text field and 15 minutes of time. After 15 minutes

[1] After we administrated a sufficient number of high and low affordance conditions, we began administering a medium condition, which was a hybrid of the two. This condition is not described or analysed due to an insufficient sample size (n=23) for analyses that rely on this condition.

had elapsed, or when participants clicked the next button, the next screen was loaded, and the task was marked complete. We then asked participants to reflect on this task, in terms of their engagement, concentration, performance, and perceived skill and difficulty. We also assessed a variety of trait constructs.

3.2. Measures

Construal manipulation check: We inspected the answers given to the 'why' and 'how' questions to determine the degree they indeed gave more abstract or more concrete answers as intended. We found that 3 of 199 did not give answers aligned with the question and a further 18 gave ambiguous answers. They were excluded from the analysis.

Affordance manipulation check: The different affordance conditions had an impact on self-reported assessment of potential distractions (*While I was doing the task, I was aware of other activities I could engage in*; $F(1, 153) = 10.98$; $p = 0.001$), indicating the affordance condition was successful.

Focused immersion: We applied the Agarwal and Karahanna's (2000) measure of focused immersion, consisting of five items, all using 7-point Likert agreement response scales. Two sample items were "I was immersed in the task I was doing" and "I blocked out distractions". Data showed satisfactory internal reliability (Cronbach's Alpha = 0.84), and moderately strong inter-item correlations, as shown in Table 3.

Item	Mean	SD	Skew	Kurtosis	FI1	FI2	FI3	FI4	FI5
FI1	4.93	1.491	-0.759	0.168					
FI2	4.68	1.532	-0.518	-0.260	0.54				
FI3	5.05	1.526	-0.732	-0.244	0.59	0.67			
FI4	5.28	1.577	-0.770	-0.486	0.51	0.30	0.42		
FI5	4.91	1.661	-0.535	-0.742	0.58	0.37	0.47	0.67	
FI*	4.97	1.214	-0.430	-0.556	0.82	0.73	0.80	0.75	0.80

Table 3. Measurement data of focused immersion (Latent construct; Item-total correlations are raw)*

Control variables: Based on the literature, we included control variables related to the particular task, such as skill (Engeser and Rheinberg 2008), the depletion state at the start of the experiment (Muraven and Baumeister 2000), trait self-control (Tangney et al. 2004), and self-control related to technology in particular (Zwanenburg 2016). The constructs are listed in Table 4.

Construct	Measurement	Mean; SD
RestedState* – the degree to which participants felt well-rested.	*Right now, are you well rested?* [7-point Likert, with anchors *Not rested at all* and *Very well-rested*]	4.88; 1.343
AnxietyToday* – the degree to which stress or worry had been experienced today.	*How much stress have you experienced today?* [7-point Likert, with anchors *No stress at all* and *A lot of stress]* *How much have you worried today?* [7-point Likert, with anchors *Not much at all* and *Very much*] (Cronbach's Alpha = 0.88)	3.48; 1.695 3.54; 1.722
Impulsivity** – the tendency to act on a whim.	*How impulsive do you think you are?* [7-point Likert, with anchors *Not impulsive at all* and *Very impulsive*]	4.03; 1.333
TSC** – Trait Self-Control	Tangney et al.'s (2004) Trait Self-Control scale, consisting of 13 5-point Likert items (Cronbach's Alpha = 0.81)	2.95; 0.63
SAS** – Smartphone Addiction as the frequency of conflicted smartphone use	Zwanenburg's (2016) Smartphone Addiction Scale, consisting of 6 item-set indicators (Cronbach's Alpha = 0.90)	4.50; 1.05
AbsorbInfo*** – the skill of absorbing new information (relevant skill)	*How do you rate your ability to absorb new information?* [7-point Likert, with anchors *Very weak* and *Very strong*]	5.02; 1.054
ICanWrite*** – the skill of writing (relevant skill)	*How do you rate your writing skills?* [7-point Likert, with anchors *Very weak* and *Very strong*]	4.59; 1.385

*Table 4. Measurement of control variables, based on *Ego-depletion theory, **Self-control literature, and ***Skill-immersion literature*

3.3. Sample

In total 199 students completed the session, 155 of which we used for the data analysis because of the aforementioned exclusions. The descriptive statistics of their demographics are given in Table 5. The sample was evenly spread to all conditions with around 39 participants per cell (SD=2.58).

Gender	Male	n=62	40.0%
	Female	n=93	60.0%
Age	18-25	n=131	84.5%
	26-34	n=19	12.3%
	35-54	n=5	3.2%
Region lived most	New Zealand	n=102	65.8%
	Other	n=53	34.2%
Study year		mean = 2.91	SD = 1.71

Table 5. Descriptive statistics of the sample

4. RESULTS

To test Hypothesis 1, we first conducted a one-way ANOVA. Focused immersion in the low affordance condition had a mean of 5.16 (SD = 1.22) and in the high affordance condition a mean of 4.77 (SD = 1.18). The variances were homogeneous (Levene statistic = 0.093, p = 0.761) and the means were significantly different, with F(1,153) = 4.043 and p=0.046. Hence, as expected, individuals in the high affordance condition experienced less focused immersion during the task than those in the low affordance condition.

We also conducted regression analyses with and without control variables, with results shown in Tables 6 and 7, under the header *Complete group*. As can be seen from Table 6, while the inclusion of control variables helped explain more variance, this did not undermine the observed relationship between affordance and focused immersion. Taken together, these results indicate support for Hypothesis 1.

Model		**Complete group; n=155**			**Low Construal; n=81**			**High Construal; n=74**		
		Beta	t	Sig.	Beta	t	Sig.	Beta	t	Sig.
1	(Constant)		38.14	0.000		31.59	0.000		23.05	0.000
	Affordance	-0.160	-2.01	0.046	-0.296	-2.75	0.007	-0.033	-0.28	0.779
2	(Constant)		4.81	0.000		4.06	0.000		2.83	0.006
	Affordance	-0.163	-2.13	0.035	-0.320	-3.01	0.004	0.098	0.85	0.398
	RestedState	0.127	1.57	0.118	0.157	1.48	0.144	0.017	0.14	0.889
	AnxietyToday	0.069	0.84	0.402	0.245	2.27	0.026	-0.123	-0.93	0.354
	Impulsivity	-0.096	-1.19	0.238	-0.156	-1.35	0.183	-0.070	-0.62	0.536
	TSC	0.071	0.77	0.445	-0.008	-0.06	0.950	0.087	0.64	0.527
	SAS	-0.204	-2.44	0.016	-0.210	-1.88	0.064	-0.231	-1.82	0.073
	AbsorbInfo	-0.012	-0.14	0.889	0.051	0.42	0.679	0.106	0.89	0.379
	ICanWrite	0.230	2.78	0.006	0.111	0.91	0.366	0.329	2.98	0.004

Table 6. Regression analyses with focused immersion as dependent variable without control variables (Model 1) and with control variables (Model 2). Reported coefficients are standardized.

Model		**Complete group; n=155**	**Low Construal; n=81**	**High Construal; n=74**
1	R^2	R^2 = 0.026	R^2 = 0.087	R^2 = 0.001
	Adjusted R^2	Adjusted R^2 = 0.019	Adjusted R^2 = 0.076	Adjusted R^2 = -0.013
	F	F(1, 153) = 4.043	F(1, 79) = 7.561,	F(1, 72) = 0.079
	Significance	p = 0.046	p = 0.007	p = 0.779
2	R^2	R^2 = 0.188	R^2 = 0.245	R^2 = 0.294
	Adjusted R^2	Adjusted R^2 = 0.143	Adjusted R^2 = 0.161	Adjusted R^2 = 0.207
	F	F(8, 146) = 4.213	F(8, 72) = 2.918	F(8, 65) = 3.382
	Significance	p < 0.001	p = 0.007	p = 0.003

Table 7. Overall results from the various regression models without control variables (Model 1) and with control variables (Model 2).

To test Hypothesis 2, we conducted two-way ANCOVA analyses, without control variables and with control variables ICanWrite and SAS, respectively, as these were significant predictors. The interaction of affordance and construal was found insignificant ($F(1, 151)=2.281$, $p = 0.133$) and significant ($F(1, 149)=6.513$, $p=0.012$), respectively. This meant that only when accounting for the control variables, the ANCOVA analyses supported Hypothesis 2.

We then conducted two regression analyses for the low and high construal respectively, with the results in Tables 5 and 6, under the respective headers. With or without taking control variables into account, affordance was significantly and negatively associated with focused immersion in the low construal condition ($\beta < -0.29$, $p < 0.01$), and affordance was not significantly associated with focused immersion in the high construal condition. These regression analyses indicated that high construal levels indeed protect against the negative impact of exposure to tangential IT affordances on focused immersion. Taken together, we found moderate to strong support for our two Hypotheses.

5. DISCUSSION

The rise of ubiquitous, hyper-functional devices increasingly affords us with possibilities to deviate from a chosen course of action and to interrupt our engagement in a particular activity. Our findings indicate that, overall, exposure to tangential IT affordances indeed affects focused immersion negatively. Individuals in the low construal level condition were affected more than those in the high construal level condition, providing evidence that higher-level, abstract ways of thinking can help protect against the potential disruption driven by an exposure to IT affordances.

This finding is based on a single task in a laboratory environment. While a task was chosen that was similar to what participants could expect in their occupation, the setup is not representative of people's everyday activities or tasks. On the one hand, the location of a computer lab where answers and responses were rewarded with a voucher may have led to a sense of social obligation to engage in the task. On the other hand, given its one-off nature, the task was isolated from people's lives and may be perceived as being less meaningful than the actual tasks encountered in daily life, potentially undermining focused immersion. However, we controlled for various task-specific factors and the main findings did not substantially differ.

While the sample included university students only, there are no specific indicators in our literature review that our findings would be substantially different across adult ages, generations, or occupations. Future work could confirm the generalizability of the findings across such groups.

Notwithstanding these limitations, our finding raises questions on interesting practical implications: can individuals, when they start to notice distractive use of IT during a task, ask themselves why they do the things they do, to help them restore their focused immersion in that task? Future work can examine when such practical self-help is effective. Other work could attempt to conceptually and empirically tie in the results with other factors of focused immersion and develop a more comprehensive model of the construct. A better understanding of focused immersion in modern work environments might ultimately help individuals deeply engage with their activities.

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Acknowledgements

I thank Khai Trieu Tran for his invaluable help in the cleaning, analysis, and reporting of the data. I also thank the Research Committee of the Division of Commerce of the University of Otago for the Commerce Research Grant that has allowed for this study.