

Virtual reality work environments to support return to work after burnout sick leave

Stephanie Delroisse, Moïra Mikolajczak (UCLouvain) and Aurélie Wagener (ULiège)

INTRODUCTION

Return to work (RTW) after sick leave is facilitated by RTW self-efficacy (i.e., one's belief of capacity to complete the process of RTW and to overcome obstacles), RTW expectations (i.e., the perceived duration of the work resumption process) and work ability (one's evaluation of work capability accordance with the work demands and his/her state of health; Corbière et al., 2020; Gragnano et al., 2018; Selander et al., 2020; Volker et al., 2015). **Work Focused Cognitive Behaviour Therapy** (W-CBT) has shown positive effects on RTW (for reviews, see Brämberg et al., 2024; Slater et al., 2023). It emphasized on specific components as, for example, *work related psychoeducation, work-related cognitive therapy and gradual return to work plan as exposure*.

Learning to cope with RTW difficulties while enhancing self-efficacy is essential when returning to work, even on a part-time basis. In this perspective, using **virtual reality** (VR) to expose individuals to RTW's situations is promising since one of the advantages of virtual reality compared to real-life situations, that is greater control and security over the exposure situations. VR has been shown to be effective in the treatment of cognitive, psychological, motor and functional impairments for psychiatric disorders (for a meta-review of meta-analyses, see Dellazizzo et al., 2020).

The **present study** has three main objectives. First, it examined the effectiveness of VR-based preparation for RTW, specifically its impact on RTW self-efficacy, work ability, and RTW expectations. Second, it investigated whether VR exposure reduces RTW-related anxiety over time. Third, it explored the effects of VR exposure therapy (VRET) on negative emotions.

METHOD

Participants : 32 participants (23 females) on sick leave aged from 24 to 63 years old ($X = 45.22, SD = 10.81$) took part in the study and were randomly assigned (i.e., Randomized Control Trial) to one of two groups: *the experimental group* completed three 50-minute of VR sessions simulating common workplace interactions during return-to-work situations (the open space (OS), the meeting room (MR) and a living room as the working from home apartment (WFH), see Figure 1), while *the control group* engaged in three 35-minute of VR relaxation in a "quiet" desk.



Figure 1. Screenshots from VR environments

Procédure :

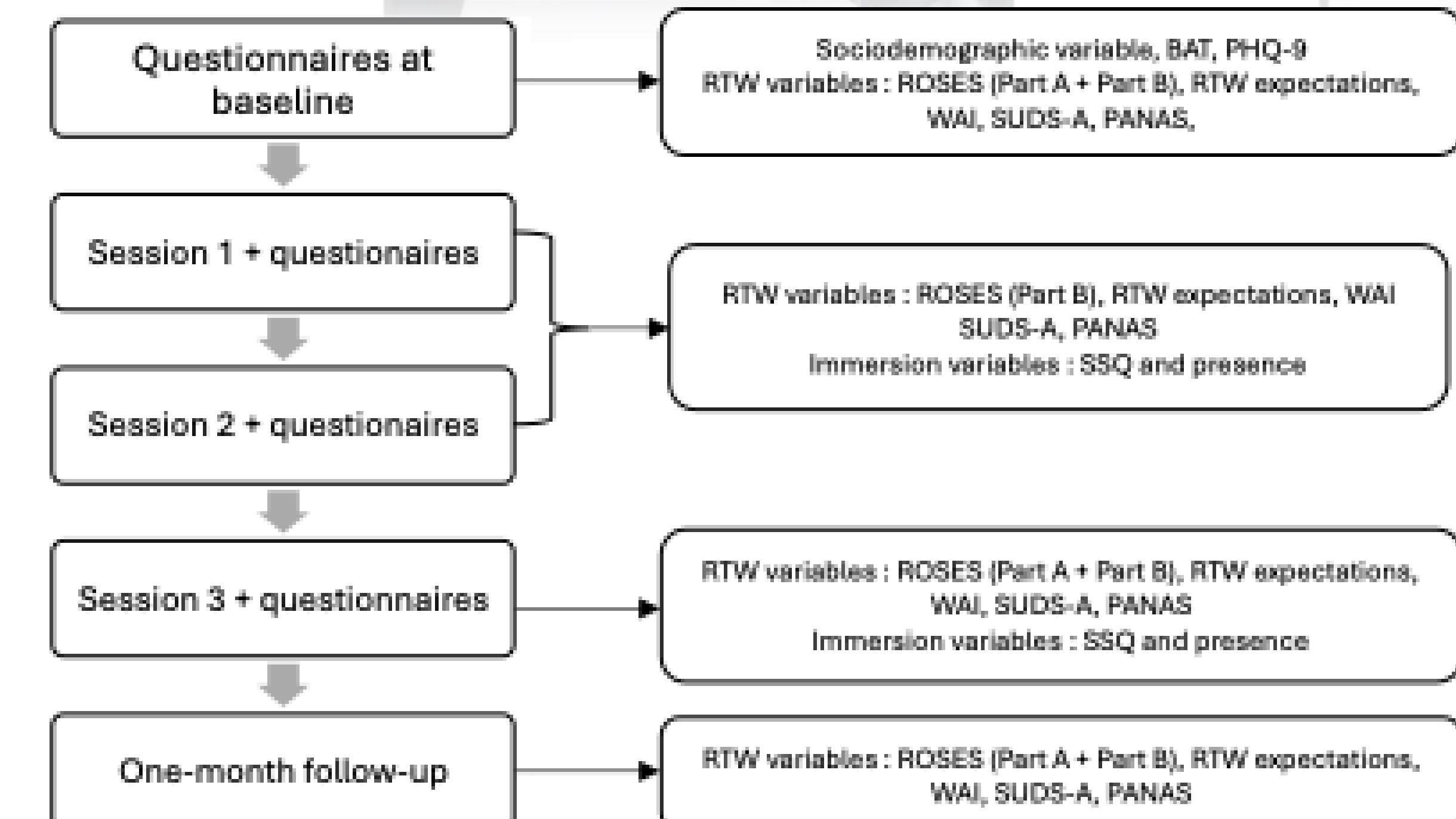


Figure 2. Flowchart illustration of the study design

Measures :

- **Job burnout** measured by the Burnout Assessment Tool (BAT; Schaufeli, Desart & De Witte, 2020).
- **RTW self-efficacy** (RTW-SE) measured by the Return-to-Work Obstacles and Self-Efficacy Scale (ROSES; Corbière et al., 2017) consisting in 10 dimensions including "Difficult relationships with the immediate supervisor", "Difficult relationships with colleagues" and divided into 2 parts : Part A (i.e., How much of an obstacle it is for the individual) and Part B (i.e., How well the individual feels able to overcome the obstacle).
- **RTW expectations** measured by 2 items created based on the systematic review by Gagnano et al., 2021) : RTW1: likelihood of returning to work; RTW 2: likelihood of returning to the same employer.
- **Work ability** (WA) measured by 2 items of the Work Ability Index (WAI; Tuomi et al., 1998) : Current work capacity compared to the highest work capacity ever achieved and Estimation of work incapacity due to illness
- **RTW Anxiety** measured by a visual analogue scale of anxiety (SUDS-A – Subjective Unit of Disturbance Scale for Anxiety) from 0 to 10.
- **Negative affects** measured by the Positive and Negative Affect Scales (PANAS; Watson, Clark & Tellegen, 1988).
- **Depression** as measured via the Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer & Williams, 2001).
- **Sense of presence** measured by the Four presence dimensions (Wagener and Simon, in preparation cited in Libera et al., 2023) including "place illusion" (i.e., the sense of being in the place); "plausibility illusion" (i.e., the feeling that the scenario is actually taking place); "copresence illusion" (i.e., the sense of sharing the environment with other characters); and "social presence illusion" (i.e., the feeling that a psychological link exists between oneself and the other characters).
- **Cybersickness** measured by the French version (Bouchard et al. 2011) of the Simulator Sickness Questionnaire (SSQ; Kennedy et al., 1993) with 2 subscales : (1) nausea (e.g., increased salivation) and (2) oculomotor symptoms (e.g., eye fatigue).

RESULTS

At baseline, burnout was very high and did not differ significantly between groups, $F(1) = 2.34, p = .26$. Depression was moderate overall ($M = 10.16, SD = 6.02$) but was significantly higher in the control group ($M = 12.63, SD = 7.03$) than in the VR group ($M = 7.69, SD = 3.53$), $F(1) = 6.30, p = .02$. Therefore, baseline depression was included as a covariate in the analyses. When controlling for depression, there was a significant main effect of Time, $F(1,29) = 7.95, p = .01, \eta^2 = .22$, and a significant Time \times Condition interaction, $F(1,29) = 4.56, p = .04, \eta^2 = .14$, indicating that changes in burnout over time differed between groups.

	Group	Baseline	Session 1	Session 2	Session 3
Burnout	VR	3.42 (.46)	/	/	2.79 (.58)
	Control	3.61 (.45)	/	/	3.46 (.64)
	Total	3.52 (.46)	/	/	3.12 (.69)
RTW-SE A	VR	3.62 (1.16)	/	/	3.40 (1.12)
	Control	4.14 (1.28)	/	/	3.87 (1.04)
	Total	3.88 (1.23)	/	/	3.64 (1.09)
RTW-SE B	VR	4.69 (1.15)	4.56 (1.00)	4.82 (1.12)	5.11 (1.00)
	Control	4.23 (1.19)	3.84 (1.01)	3.89 (1.12)	4.38 (1.07)
	Total	4.46 (1.17)	4.20 (1.05)	4.35 (1.20)	4.74 (1.08)
RTW-SE Sup. B	VR	4.48 (1.79)	4.19 (1.75)	4.38 51.68)	4.76 (1.62)
	Control	4.09 (1.68)	3.85 (1.75)	3.86 (1.79)	4.24 (1.73)
	Total	4.29 (1.72)	4.02 (1.73)	4.12 (1.73)	4.50 (1.67)
RTW-SE Col. B	VR	4.54 (1.68)	4.71 (1.44)	4.92 (1.52)	5.02 (1.25)
	Control	4.07 (1.55)	3.96 (1.52)	3.88 (1.63)	4.35 (1.65)
	Total	4.30 (1.61)	4.33 (1.51)	4.40 (1.63)	4.69 (1.48)
RTW 1	VR	5.75 (1.88)	6.44 (1.03)	6.56 (.81)	6.31 (1.08)
	Control	5.44 (2.10)	5.44 (1.50)	5.44 (1.83)	5.56 (1.93)
	Total	5.59 (1.97)	5.94 (1.37)	6.00 (1.50)	5.94 (1.59)
RTW 2	VR	4.44 (2.46)	4.63 (2.34)	4.75 (2.60)	4.69 (2.63)
	Control	3.38 (2.53)	2.88 (2.50)	2.94 (2.46)	2.94 (2.49)
	Total	3.91 (2.52)	3.75 (2.54)	3.84 (2.65)	3.81 (2.67)
WA - current	VR	3.94 (2.35)	4.94 (2.21)	4.88 (1.86)	5.63 (2.16)
	Control	2.88 (2.09)	2.87 (2.09)	3.13 (2.28)	3.25 (2.44)
	Total	3.41 (2.26)	3.91 (2.36)	4.00 (2.23)	4.44 (2.56)
WA - estimation	VR	3.06 (1.81)	2.88 (2.71)	3.63 (3.36)	4.56 (4.08)
	Control	2.31 (1.58)	2.50 (1.71)	2.75 (1.98)	2.75 (1.94)
	Total	2.69 (1.71)	2.69 (2.24)	3.19 (2.75)	3.66 (3.28)
Anxiety	VR	6.31 (2.39)	6.06 (2.84)	5.44 (2.58)	5.75 (2.89)
	Control	8.64 (1.34)	7.14 (2.66)	8.21 (1.58)	8.29 (1.38)
	Total	7.40 (2.27)	6.57 (2.78)	6.73 (2.56)	6.93 (2.61)
PANAS - Neg	VR	24.00 (7.51)	22.81 (7.11)	22.06 (9.83)	22.75 (9.33)
	Control	27.69 (8.33)	25.44 (8.43)	25.13 (8.43)	22.44 (9.44)
	Total	25.84 (8.02)	24.13 (7.79)	23.59 (9.14)	22.59 (9.23)

Concerning the RTW variables, due to the low number of participants who responded to the follow-up ($n=10$), the analyses focused solely on the baseline and the three sessions. For RTW-related anxiety, there was no significant time effect or interaction, but a significant group effect was observed ($F(1) = 4.50, p = .04, \eta^2 = .14$). For the total RTW self-efficacy score, RTW self-efficacy related to supervisors, and RTW self-efficacy related to colleagues, no significant time effect, group effect, or interaction was found. Similarly, for RTW expectations no significant effects were observed for time, group, or interaction. For current work ability (WAI), a significant time effect emerged ($F(2) = 4.77, p = .01, \eta^2 = .14$), but no significant group effect or interaction was found. No significant time effects, group effects, or interactions were found for estimated work ability due to illness, negative affect, or positive affect.

Regarding the immersive properties of the environments, participants in both groups reported low levels of cybersickness. Mean nausea scores were 1.69 ($SD = 1.97$) at T1, 1.13 ($SD = 1.36$) at T2, and 2.09 ($SD = 3.18$) at T3. Mean oculomotor scores were 3.50 ($SD = 2.66$) at T1, 3.00 ($SD = 3.46$) at T2, and 3.97 ($SD = 3.91$) at T3. For participants in the VR group, the sense of presence remained high across all sessions. Mean place presence scores were 23.88 ($SD = 4.11$) at T1, 22.50 ($SD = 3.88$) at T2, and 22.25 ($SD = 4.36$) at T3. Mean plausibility scores were 21.00 ($SD = 4.60$) at T1, 20.13 ($SD = 4.54$) at T2, and 20.25 ($SD = 4.78$) at T3. Mean copresence scores were 18.31 ($SD = 3.81$) at T1, 17.00 ($SD = 5.97$) at T2, and 18.63 ($SD = 5.58$) at T3. Mean social presence scores were 17.94 ($SD = 3.99$) at T1, 15.50 ($SD = 5.15$) at T2, and 19.06 ($SD = 5.07$) at T3.

DISCUSSION

Although RTW-related variables did not improve with VR, the significant decrease in burnout symptoms observed in the VR group may reflect a pattern similar to 'sudden gains' in psychotherapy—marked and rapid symptom reductions that often predict better long-term outcomes (Shalom & Aderka, 2020). This suggests that VR interventions might trigger abrupt shifts in emotional or cognitive processing, particularly for burnout, even when functional work-related indicators remain unchanged in the short term. The absence of significant RTW effects may partly stem from methodological issues. First, only Part A of the ROSES was administered at baseline, session 3, and follow-up, while Part B was assessed at every session, yet responses to Part B depended on Part A, limiting comparability. Second, assessments were done immediately post-VR, so, for example, RTW-related anxiety measured right after a VR session may have reflected the emotional impact of the exposure itself, rather than general anxiety about returning to work. Although follow-up data could have offered a more accurate view of these effects, the low response rate at follow-up prevented this type of analysis.

Regarding VR exposure, participants faced scenarios without prior preparation; for instance, they had to spontaneously express RTW preferences during a virtual discussion with their manager, possibly heightening anxiety. Moreover, exposure alone is likely insufficient as preparation for returning to work. Indeed, work-focused cognitive behavioral therapy (W-CBT) typically includes essential components such as vocational goal setting, work-related psychoeducation, behavioral activation with a graded return-to-work plan, problem-solving strategies for occupational challenges, and practical homework assignments (Slater et al., 2023). Therefore, future research should incorporate these additional interventions alongside VR exposure.

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