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Assessment of Cognitive Impairment Generated By Job Strain Case of Call Center Teleoperators in Kinshasa, Republic Democratic of Congo

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ABSTRACT

This study is a first neuropsychological evaluation of cognitive Impairment generated by the job strain to the teleoperators in call centers in sub-Saharan Africa; Particularly in the Democratic Republic of Congo, city of kinshasa. This study established a statistically significant relationship between Exposure to psychosocial factors (high psychological demand and low decision latitude) and the appearance of job strain in teleoperators.It also showed a statistically significant relationship between job strain and the appearance of cognitive disorders in teleoperators.Lastly, the exposure duration at the call center of six months or more, was retained as necessary time to see the psychosocial factors negatively impacting the mental health of the call center teleoperators.

1. Introduction

The telephone call center, an important production unit in the telephony industry, attracts great interest among specialists of work mental health. Jean-Pierre Brun et al (2003), Chouanière, D. et al (2011). According to the research group Shepell (2008), "the call center industry faces many specific problems related to their structure, the nature of work and their employees' demographics. Researchers have found that call center work differs from other forms of work, due to a high level of stress, Control or autonomy at work, a variety of tasks and heavy demands ... "This statement is corroborated by studies published by Dessors, D. et al. (1979), Arnetz, BB. (1999), Stansfeld et al (2006), Clay, E. et al (1997), and Wieclaw, J. et al (2005), which examined working conditions in call centers and concluded that "working conditions in call centers are stressors." Cousin, O. et al (2002) emphasize in their conclusion that "call centers are a new form of deterioration in working conditions".

For call centers in the City of Kinshasa, work is organized in a separated or collective room. The teleoperator or employee assigned to this service to carry out his work wears a headphone in permanence for 8-9 hours with a break of 15-20 minutes per day. He uses a corded or cordless telephone, a computer and computer support in a noisy environment. This noise comes mainly from telephone conversations of his colleagues as well as conversations with customers over the phone.

The relation with the customers is established by means of speech on the telephone. In front of a large flow of telephone calls to be managed, the requirement to satisfy customers and the listening of conversations by its supervisor put the teleoperator in the conditions of permanent emotional tension because of the frequent dissonances between his real feelings and the calm appearance he displays towards his interlocutor.

In conclusion, the teleoperator in call centers of the city of Kinshasa is exposed like the teleoperator of the literature to an important psychological stress

Problematic

Telephone call centers are booming in the Sub-Saharan Africa, especially with offshoring. Dufau, M. et al. (2002), Lechat, N. et al. (2003) and Perrier, P. (2002). In the Democratic Republic of Congo in particular, these centers have existed for thirty years but no studies have been carried out to assess daily noise exposures and their impacts on teleoperator mental health. Planeau, V. et al. (2003). According to Bonde (2008), Netterstrom et al (2008) and Stansfeld and Candy (2006) have shown that exposure to work-related stresses contributes to the occurrence of mental disorders such as depression, anxiety, cognitive impairment.

This study aims to fill this emptiness by the neuropsychological assessment of the global cognitive disorders generated by the chronic stress in professional sector of call centers in the city of Kinshasa.

Objectives

The main objective of this study is to contribute to the knowledge of Cognitive disorders generated by chronic stress or job strain in call Centers in Kinshasa.

The secondary objectives will help us to

-Describe the socio-demographic data of teleoperators;

-Determine the proportion of teleoperators with chronic stress also called job strain.

-Determine the proportion of teleoperators with global cognitive Impairment;

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-Measure the association between chronic stress or job strain and Global cognitive disorders.

2.1 Nature and Place of Study

2.1.1 Nature of the Study

This doctoral study is a descriptive and transversal study based on the psychopathological approach in the workplace. Data collected during the survey were described and analyzed to obtain results related to the research objectives. From a temporal point of view, this study is retrospective and transversal. Data were collected during one year, i.e.

2.1.2 Study Location

Data were collected in Kinshasa, called Leopoldville from 1881 to 1966; it is the political and administrative capital of the Democratic Republic of Congo (DRC), the seat of all political institutions. It had 12,071,000 inhabitants in 2016 with an area of 9,965 km2. Kinshasa is the third most populous city in Africa after Cairo and Lagos, located on the south bank of the Congo River, facing the capital of the Republic of Congo Brazzaville. Kinshasa has a dual status: Administrative City and Province.Its inhabitants are Kinois, they speak the French administrative language and Lingala, the vernacular language. It hosts over ten Universities and Higher Institutes, five major mobile phone companies from where were collected the data of this study.

2.2. Population of the Study

The target population of this study are employees of call centers of the telephone companies, called "teleoperators". A teleoperator is a key person in the telephone company: from a simple high school graduate or a university graduate, he works through subcontracting, posted at his workplace in front of the screen with headphones, the interface between the company and the customer. This employee works with the headphone for 8-9 hours with a break of 15 - 20 minutes on average per day. Always connected to the communication tools (telephone, internet and Informatics support), he is constantly under the control of his supervisor who monitors all conversations with clients. Finally, the teleoperator is subject to intensemanagerial and communication stress.

2.3 Selection Criterion

2.3.1. Inclusion Criterion

The present study recruited on the basis of verbal informed consent a sample of the suitability of 110 teleoperators of both sexes, all working in the call centers in Kinshasa.

2.3.2. Exclusion Criterion

Any subject who has suffered from a medical condition attested by a physician such as: high blood pressure, diabetes, epilepsy, meningitis or having experienced a stroke, cranial trauma. Pathologies that have a direct impact on cognition.

3.1. Enlighted Consent

Before participating in the study, all teleoperators had to give their verbal consent in which they agreed to participate in the study after explanations provided by the investigator or researcher according to Helsinki II Declaration. Participants were informed about the terms of their participation and the objectives of the research. Their privacy was kept secret and Confidentiality was warranted.

3.2. Study Variables

3.2.1. Dependent Variables

- Job strain;
- Cognitive disorders.

3.2.2. Independent Variables

- Age: recoded in two modalities;
- Marital status: single and married;
-Study level = simple school graduate and university graduate;
- Sex = Male and Female.

Data on daily speech sound exposure at call centers was divided into two classes, subjects exposed in less than six months and those exposed in six months and over.

3.3. The data collection

Data collection was conducted in two steps.

The First Step

3.3.1 Assessment of job strain or chronic stress.

Psychosocial factors are recognized as risk factors of work professional mental health. Several studies have evaluated their validity using Karasek, Siegrist Hobfoll or Stays model.

For this study, we chose Karasek model which is the main internationally accepted tool for assessing these factors.

3.3.2. Presentation of the data collection tool

Karasek model was designed by Mr. Robert Karasek sociologist and American psychologist in 1979 to assess psychosocial factors at work, determining job strain. It consists of 26 questions and assesses three dimensions.

A) The psychological demand

In this case, the model assesses the psychological burden associated with task performance, task quantity and complexity, interrupted tasks, conflicting demands, unforeseen tasks and time constraints. Nine questions explore this dimension.The score is obtained by the following formula: Q10 + Q11 + Q12 + (5-Q13) + Q14 + Q15 + Q16 + Q18. The

score is calculated over 36 and the threshold is at 21. GUIGNON (2008).Job strain is a combination of a strong psychological demand and a little decision latitude. In other words, if an individual's psychological demand score is below the threshold of 21 and the decisional latitude score is below the threshold of 70, the individual is in a job strain situation, a state of chronic stress leading to mental health problems. GUIGNON et al (2008).

B) Decision-making latitude

It takes into account decision-making autonomy and skills

1) Decision-making autonomy.It is explored by questions Q4, Q6, Q8 the score is calculated by the following formula: 4 x Q4 + (5-Q6) + Q8.

2) It is explored by the questions Q1, Q2, Q3, Q5, Q7, and Q9. The calculation formula is the following: 2 x Q1 + (5-Q2) + Q3 + Q5 + Q7 + Q9. The decisional latitude score is given by the addition of 1 and 2. The threshold is 70, Atousanté (2016).

C) Social Support

It is assessed by 9 questions from Q19 to Q26, the score is calculated on 16 and the threshold is 8 if the score is less than 24, social support is low. This study used the French version of Karasek model validated and standardized by the Sumer survey. Niedhammer (2002).

The 2nd Step

3.4. Cognitive Disorders Assessment

These disorders were explored by the rapid assessment scale of cognitive functions.

3.4.1. Presentation of the tool

This test was designed by Gill, R., Toullat, G., et al. (1986). It is highly correlated with the mini-mental state, allowing in less than fifteen minutes a psychological mini-study, studying orientation time, space, learning, memory of numbers or immediate memory, mental calculation,

reasoning, judgment, understanding, denomination, repetition, praxis, fluency of language and understanding of a written order.

The assessment of all these functions belongs to the assessment of working memory because it constitutes a system of temporary maintenance and manipulation of information necessary for carrying out complex cognitive activities such as judgment, understanding, learning, reasoning, etc. Baddeley (1986).

The assessment of cognitive deficits or cognitive disorders is estimated in a global way: - a score below 46 for subjects under 60 and a cultural level higher than 4 indicates the presence of cognitive impairments. The maximum score on the questions on the scale is equal to 50 points.

3.5. Data Analysis Plan

The data collected were entered, cleaned and coded in Microsoft Excel R Version 2007 and then analyzed with the SPSS 20 software to describe the socio-demographic characteristics of respondents (age, gender, level of education, marital status).Qualitative variables were described in the frequency tables, the quantitative variable was described by calculating the measures of central tendency and dispersion. In order to study the association between exposure to vocal noise at the call center, job strain and cognitive disorders, we compared the proportions, and the Pearson chi-square test was used to identify it the influence of exposure to voice noise on the call center on job strain and cognitive impairment, for a significant level of 5%. For both analyses, the modality "equal to or greater than 6 months" was considered as a reference because no data in the literature provided information on the minimum duration of exposure to voice noise at the call center cause cognitive impairment and job strain.

Stratified analyses were carried out and the odd ratio of the different strata to study the interaction of socio-demographic data on the onset of cognitive disorders and their confidence intervals were calculated.

3.6 Results

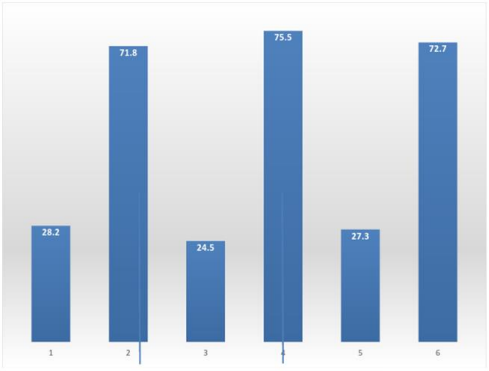
The results of all these analyses of different variables were treated together to form a continuum.

Table 1. Distribution of respondents according to personnel socio-demographic characteristics.

	N	%
Sex		
Female	32	29.1
Male	78	70.9
Total	110	100
Age range		
22 - 30	69	62.7
31 - 38	41	37.3
Total	110	100
Level of Study		
Associate Degree	51	46.4
Univ. Graduate	59	53.6
Total	95	100
Marital Status		
Unmarried	102	92.7
Married	8	9.3
Total	110	100

Age: Mean ± Standard deviation (Minimum, Maximum) = 29 ± 4 years (22 years, 38 years)In the population of this study, 70.9% are male, 62.7% are between 22 and 30 years of age. The majority of our respondents (53.6%) have a university degree, i.e., Associate Degree and Bachelor Degree.The overwhelming majority of them are single.

Figure 1 shows that 71.8% of the respondents were exposed to voice-related noise at the call center for 6 months or more, the presence of job strain and cognitive impairment were observed respectively at 75.5% and 72.7%.



Graph 1. Distribution of respondents according to clinical characteristics: duration at the call center, Job Strain and cognitive impairment.

Table 2. Study of the association between the duration of exposure to voice noise and job strain.

Variable	N	% Job Strain	OR Gross [IC - 95%]	P- Value
Duration of exposure			405.60 [45,3632.93]	<0.001
≥ 6 months	79	98.7		
< 6 months	31	16.1		

Table 2: shows that the duration of exposure to voice noise at the call center is very significantly (p = 0.001) and very strongly associated (Odd ratio = 405.60) with job strain at the 5% threshold. A subject exposed to vocal noise at the call center for six months and over, runs the risk of 405.60 times suffering from a job strain. Exposure to voice noise at the call center is a major determinant of job strain.

Table 3. Study of the association between duration of exposure and cognitive impairment.

	N	% of cognitive impaires	OR Gross [95% CI]
Duration of exposure			97.50 [24.32 ; 390.81]
≥ 6 months	79	94.9	
< 6 months	31	6.10%	

Table 3: indicates a very strongly significant association between the duration of exposure to vocal noise at the call center and cognitive disorders (p = 0.001 and Odd Ratio = 97.50) at the 5% threshold. The result shows that a person exposed to vocal noise for six months and more at the call center runs a 97.50 risk of having cognitive impairment.

Table 4. Study of the association between job strain and cognitive disorders.

	N	% cognitive impairment	OR Gross [IC to 95%	P-value
Job strain				
Presence of jobstrain	83	96.4	Indefinite	<0,001
Absence of job strain	27	0.0		

Phi = 0.93

Table 4 shows that job strain is very significantly (p = 0.001) and very strongly associated (Phi = 0.93) with global cognitive disorders at the 5% threshold. The Odd Ratio is undefined due to 0% of overall cognitive impairment among subjects who have not suffered of job strain.

The bivariate analysis of each independent variable with job strain shows that there is no change in the effect of exposure to call center noise and the appearance of Job Strain at the 5% threshold: age (P = 0.06), sex (p = 0.4) Marital status (p = 0.97) Level of study (p = 0.51).

Table 5. Bivariate analysis of potential factors associated with job strain.

Variable	N	% job strain	OR Gross [IC to 95%]	P-value
Age				
22 - 30	69	69.8	0.39 [0.13 -1.17]	0.06
31 - 38	41	85.4		
Sex				
Male	78	83.3	3.89 [1.42 -	0.4
Female	32	56.2	10.80]	
Marital Status				
Unmarried		75.0		
Married	1028	75.7	0.97 [0.16 -7.49]	0.97
Level of Study				
AssociateDegree	51	72.5	0.75 [0.29-1.94]	0.51
Univ. Graduate	59	78		
Duration of exposure				
≥ 6 months	79	98.7	405.60[45.28-	0.001
< 6 months	31	16.1	3,632.93]	

Moreover, the results of our analysis indicate that the duration of exposure to vocal noises of the call center is significantly associated with job strain (p<0.001). The risk of suffering from job strain is higher (OR Gross = 405.60) with subjects exposed to vocal noises for more than 6 months than those with a duration of exposure of less than 6 months. In other words, the low exposure time protects against job strain.

Table 6. Bivariate Analysis of Potential Associated Factors to Cognitive impairments.

Variable	N	% of impairments Cognitives	OR Gross [IC - 95%]	P-value
Age				
22 - 30	69	66.7	0.41 [0.14-	
31 - 38	41	82.9	1.16]	0.06
Sex				
Male	32	53.1	3.7 [1.39-	
Female	78	80.8	10.00]	0.3
Marital Status				
Unmarried	102	72.5	1.14 [0.19-	
Married	8	75.0	8.69]	0.88
Level of Study				
AssociateDegree	51	68.6	0.68 [0.27-	0.36
Univ. Graduate	59	73.3	1.71]	
Duration of exposure	79	94.9	97.50	
≥ 6 months	31	16.1	[24.32390.81]	0.001
< 6 months				

After analyzing the association between each independent variable and cognitive impairment, it is found that the duration of exposure to vocal noise in the call center is significantly associated with cognitive impairment at the 5% threshold: (p =0.001).

Table 7. Multivariate analysis of potential factors associated with job strain.

Variable	OR Adjusted [IC - 95%]	P-value
Exposure duration	405.80 [42.80 ; 3841.17]	<0.001
Age	2.16 [0.35 ; 13.23]	0.75
Marital Status	2.45 [0.04 ; 131.22]	0.65

Considering other independent variables included in the multivariate analysis, one observed that the exposure duration to call center noise remains very significantly and strongly associated with job strain at the 5% threshold. This means that in our data series other variables do not change the effect of the duration exposure on job strain.

Considering other independent variables included in the multivariate analysis, we observed that the exposure duration to call center noise remains very significantly and strongly associated with cognitive impairment at the 5% threshold.

This means that in our data series the other variables do not change the effect of the duration exposure on cognitive impairments.

Table 8. Multivariate analysis of potential factors associated with cognitive impairment.

Variable	Adjusted OR [IC - 95%]	P-value
Exposure duration	126.23 [24.13 ; 660.44]	<0.001
Sex	0.15 [0.02 ; 0.83]	0.33
Age	1.18 [0.25 ; 5.56]	0.82

4. Discussion

This doctoral study showed the negative role of the chronic job strain on the mental health of teleoperators in Kinshasa. In this study, a psychopathological approach to work has identified the conjunction of psychosocial, biological and environmental factors leading to chronic stress with a minimum duration of exposure and resulting in cognitive impairment. Assumptions about age, gender, educational level, marital status of this study are verified.

4.1. Age

The mean age of this study was 29 ± 4 standard deviations. This figure is confirmed in the literature by the study of INRS (2011) and that of LeFerom (2011). But contrast with that of Hidri (2012) and Wikipedia (2016). It appears that the population of teleoperators in Kinshasa is mainly young for the following reasons:

The general population of the Democratic Republic of Congo is made up mainly of age groups ranging from 0 to 40 years, according to the age table 2010 contained in the Pyramid of Age published by the University of Sherbrooke (2016).

Young university graduates, without taking into account their training path, embark on the teleoperator business, which they consider an opportunity to escape from massive unemployment generated by the destruction of the economic fabric of the country.

4.2. Sex

The majority of the sample in this study was male. This figure contrasts with that of the literature Hidri (2012), Leferom (2012) found a female majority among teleoperators. Schooling of girls in the Democratic Republic of Congo is a plausible explanation. Indeed, according to data published by Unesco (2012), the parity index of school enrolment between girls and boys is 0.83. It is low compared to that of sub-Saharan Africa which is 0.93. Worldwide statistics (2016) published the overall rate of 32% of enrolment of 15 years and over between girl and boy in the Democratic Republic of Congo. Muderwa (2008) points out that the rate of admission of boys to the secondary cycle is generally low in all the provinces of the Congo and that of girls is even lower.

It is clear from all these figures that the girl's schooling suffers from discrimination in the Democratic Republic of Congo despite the UNICEF-supported awareness campaign. This may explain the male majority found in this study.

4.3. Level of Study

This study has identified the majority university level for teleworkers in Kinshasa is 54%. This fact contrasts with the literature data : In Senegal, the level required to exercise as teleoperator is of High school graduate according to Employment Senegal (2016). The university level may favor

a better adaptation to the new profession of teleoperator (which does not have a training academy) thanks to the knowledge acquired and the ability to project itself in the abstract in spite of the different courses taken at university.

4.4. Marital Status

In this study, the majority of teleoperators were single. This corroborates with data from the literature Hidri et al (2012). In the Congo, the fact that the studies are the responsibility of the parents, the status of married student becomes incompatible with the studies. And the status of a single person can be kept for a long time even after the studies at the beginning of the professional life due to lack of necessary guarantees allowing them to found a home.

4.5. Exposure time to voice noise at the call center

This study identified 71.8% of teleworkers who had been working at least six call centers and presented a Job Strain. However, in psychiatric practice six months refer to the notion of chronicity, which leads us to conclude that Job Strain is a state of chronic stress.

In view of this duration and the silence of the literature on this subject, the duration of six months is considered for this study as a minimum duration of exposure to voice noise at the call center, which can cause clinical manifestations and This title, this duration constitutes an argument for the mandatory rotation of teleoperators with a view to prevention.

4.6. Job Strain or chronic stress

This study observed 75.5% of teleoperators who presented job strain. For a duration of exposure to voice noise at the call center of six months and more.

Job strain is an expression of psychic suffering, a state of chronic stress. It is the result of a combination of strong psychological demand and low decision-making latitude in the call center workplace.

This is corroborated in the literature with studies of Karasek R. (1979), GUIGNON (2008). Job strain or state of chronic stress is likely to cause clinical manifestations related to mental health. In the literature, studies such as Clay E. et al (2007), Wieclaw J. et al (2005) and Niedhammer I. et al (1998) have established the relationship between Job Strain or chronic stress And depressive symptoms. Stansfeld et al (1996) argued that chronic stress is an important risk factor for psychiatric disorders.

For this study, the state of chronic stress or job strain is a major determinant of the cognitive impairments in call center teleoperators in Kinshasa.

4.7. Cognitive Disorders

Cognitive impairment is a decrease in the brain's capabilities that empowers the individual to concentrate, communicate, or perceive the environment. In a professional call center environment, this results in a difficulty in concentrating on one's work, resulting in lower performance.

This study identified 72.8% of teleoperators with global cognitive disorders correlated with exposure to voice noise at the call center. In the literature, several experimental studies confirm this finding. Colle and Watch (1976) have shown that 85dB (A) speech sound that occurs during performance of reading and recalling of verbal material, disrupts memory and decreases performance. Salame (1982, 1987) argues that performance in a memory task is disrupted by voice noise. Jones (1983) states that if a voice noise is heard during the playback and memory storage, this noise decreases performance. Other studies have assessed the impact of exposure to ambient or environmental noise on mental health, particularly on cognitive functions: Binet Alfred Sante of Sanctis (1897) and Pierre Janet (1911) were the first researchers to have discovered the disturbing role of ambient noise for attention as a result of their experience on the perimeter. Broandbent, father of experimental psychology, published in (1953), (1954), (1957) and (1958) several studies which confirmed the discovery of Sanctis and Janet.

Following his three experiments on the complex noise delivered by a loudspeaker to a group of subjects placed in front of the pendulum to monitor its stops and to trigger its restart, Jérison (1959) concludes at the end of these experiments in these terms: Ambient or environmental noise disturbs attention and affects memory.

Richard Lazarus, American psychologist, pioneer of the cognitive theory of the remediation of emotion, published in (1966), the first series of studies establishing a triple relationship between noise and Emotions, noise and stress, noise and cognition.

Several other studies have been carried out among residents and schools around the airports: Stansfeld (1993), (1996), (1999), (2005), (2006) in a multicentric ranch study of 2000 children in 90 schools around three international airports in London, Madrid and Amsterdam highlighted the relationship between ambient noise exposure and the drop in academic performance, particularly the occurrence of dyslexia in these children.

Lukas, J.S. Depree, R.B. and Swing, J. W. (1987) conducted a study in 14 schools in Los Angeles located some distance from the road. They found that children in these schools had lower scores in reading and mathematics compared to the same grade classes in schools in a non-noisy environment. Hygge, Evans and Bullinger (1998) demonstrated in a study conducted around the Munich airport that children exposed to noise for five years had a drop in performance. All these studies confirm the disruptive role of noise and its negative impact on cognitive functions.

Conclusion

At the end of the analysis of the research topic entitled "Assessment of cognitive impairment generated by Job Strain: Case of call center teleoperators in Kinshasa", Republic Democratic of Congo.

- This study made the following conclusions:

Male predominance, single marital status, university level, and average age of 29 ± 4 standard deviations for teleworkers in Kinshasa;

- Minimum duration of six months of exposure to voice noise at the telephone call center likely to have a negative impact on the mental health of teleoperators;
- Significant association between minimum six-month exposure to voice noise at the call center and the onset of chronic stress or Job Strain;
- Very significant association between chronic stress or Job Strain and the onset of cognitive impairment.
- A very significant association between the minimum duration of six months of exposure to vocal noise at the call center and the onset of cognitive impairment;
- Absence of interference in socio-demographic data on the occurrence of job strain or chronic stress, on the minimum duration of exposure to voice noise at the call center and on the onset of cognitive impairments.

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