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Emotional contagion behavior in a group of young girls in a secondary school in Maputo, Mozambique

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Abstract

Background: Emotional Contagion Behavior (ECB), the synchronized expression of emotional symptoms among members of a group, has been observed globally. In Mozambique, there have been numerous reports of ECB in recent years. Since 2010 several girls from a secondary school in Maputo City, Mozambique exhibited ECB which involved repeated fainting spells, sometimes including verbal aggression and threats to colleagues and teachers. We conducted a study to analyze sociodemographic and clinical characteristics associated with ECB.

Methods: This cross-sectional study included 154 females aged from 16 to 24 years old. We considered emotional contagion behavior as repeated fainting spells, sometimes including verbal aggression and threats to others (colleagues and teachers). Participants responded to a sociodemographic questionnaire, the Beck Anxiety Scale, and the revised Eysenck Personality Questionnaire (EPQ-R). Bivariate and multivariate logistic regression models analyzed sociodemographic and clinical characteristics associated with EBC.

Results: Among study participants, 57 presented ECB and 97 did not. The likelihood of ECB was higher among those with previous history of ECB (OR = 8.28, 95% CI [2.51, 27.30]; $p \leqslant .001$) and extroverted personality profile (OR = 1.15, 95% CI [1.01, 1.30]; $p = .038$). Having a

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LG, FM, PS, DM, and WF designed the protocol and wrote the manuscript. FM and CZ did the statistical analysis. KL, AOM, CSD, MW, and JJM did the revision. All authors agreed the final version of the manuscript.

romantic relationship was related to lower likelihood of having ECB (OR = 0.04, 95% CI [0.01, 0.19]; $p = .001$).

Conclusions: These results suggest that ECB may repeat over time and be related to challenges pertaining to personality development, the presence of sexual life, and close relationships with peers faced by adolescent girls.

Keywords

Emotional contagion behavior; emotional crisis; neuroticism; anxiety

Introduction

Emotional contagion, defined as the transmission of emotional states between people (Olszanowski et al., 2020), can occur within groups or in masse when many individuals are affected by the same pattern of physical and emotional responses simultaneously in a certain place. This phenomenon, often labeled mass hysteria, has been widely reported globally from North America (Jones et al., 2000) to Africa (Beyene et al., 2014) and South Asia (Roy et al., 2011). The symptoms of emotional contagion are often attributed to witchcraft (Colligan et al., 1982) or environmental toxins (Jones et al., 2000) by affected populations, frequently leading to conflicts and mistrust between affected populations and public health authorities who rely on scientific explanations (Balaratnasingam & Janca, 2006; Tarafder et al., 2016). Additionally, there are Egyptian reports on emotional crises from 4,000 years ago together with uterine alterations which were attributed as the cause. Hippocrates associates these conditions with sexual abstinence (Boa Saúde, 2019). This relationship between emotional crises, women, and desire followed up by Freud persists till today (Michels, 2001), and as a result we see an increased importance in exploring students' romantic relationships history and sexual intercourse. Although the epidemiology of emotional contagion cases is extensively reported (Boss, 1997; Sirois, 1974), the triggering hypotheses for the outbreak of events are practically inexistent. The analyses are limited to associating each episode with the difficulties present in the socio-cultural context in question (Dishion & Tipsord, 2011).

Many instances of emotional contagion have been identified in populations experiencing high levels of adversity (e.g. experiences of early loss, stress, or oppression), cultures with strong traditional beliefs, and people from low socio-economic levels (Otis, 2015; Small & Nicholi, 1982).

The locations of student gatherings, whether be it a classroom, school playground, sports field, or school trips, can be fertile ground for the rise of rumors, 'shared delusions based on social beliefs' and myths, because the world of a teenager is filled with turbulences, passions, insecurities, jealousy, rivalries, fears, and doubts (Bartholomew & Wessely, 2002). Moreover, friends play a central role in adolescents' emotional development (Vitaro et al., 2009), and adolescents' mental health can be directly impacted by the mental health of their friends via peer influence (Brechwald & Prinstein, 2011; Prinstein, 2007; Stevens & Prinstein, 2005). Under certain conditions, emotional episodes can transform into emotional

contagion, with the specific response varying according to culture, context, and period (Bartholomew & Wessely, 2002).

In Mozambique, a low-income country, various episodes of emotional contagion have been reported in secondary schools. In the local media, reported rates of emotional contagion have increased in the last 10 years, especially involving female students (Gouveia et al., 2011). The health care system's response to these episodes come at a huge academic and financial cost, as schools generally close for prolonged periods and health care teams are sent to the site to manage acute health needs. Despite such increase and clear impact, there is very limited data to understand what factors contribute to emotional contagion that may help guiding public health officials on how to better deal with this phenomenon and educate school managers in the handling of ECB.

In 2010, Emotional Contagion Behavior (ECB) was reported among young girls at a secondary school in Maputo city. These cases were widely publicized and were based on the belief that fainting was caused by spirits, as the school had been built over a family cemetery (Castro, 2010; Chissano, 2010)

Here, we present results of a study conducted with young girls at this school during the health care response to the crisis. The aim of this study was to determine whether there is an association between ECB and (a) sociodemographic factors and (b) psychological characteristics, including anxiety and personality profile

Methods

Study location

The present study was conducted over the course of 4 months at a secondary school in Maputo City, Mozambique during a crisis intervention by the mental health team at the Ministry of Health in response to an emotional contagion event. The ECB, which consisted in repeated fainting spells, sometimes including verbal aggression and threats to colleagues and teachers, occurred over the course of 2 weeks. The secondary school is located in the outskirts of Maputo City, in a community occupying an area of 9 km^2, with a population of 27,689 inhabitants and 5,646 households, all of which are low-income.

Sample

The sample consisted of students from the 10th to 12th grades who were referred for a clinical interview by the crisis management team because they had presented ECB. Convenience sampling was used to include students without ECB until the target recruitment numbers were reached. In total, 175 students (all female) were interviewed during crisis management (71 with ECB and 104 without ECB). The following inclusion criteria were used: (1) Students presenting EBC who were referred for clinical interview or (2) Students from the same grades of the participants presenting ECB (10–12 grades), but who did not present ECB. Parental (or caregiver) consent and youth assent were required for inclusion. About 21 students were excluded from research participation for not having completed the interview ($n = 14$) and lack of consent by the parents ($n = 7$). The final sample included 154 female students, 57 (37%) of whom had ECB and 97 (63%) who did not.

Procedures

All study procedures received ethics approval from National Bioethics Committee for Health (ref 348/CNBS). Prior to the crisis intervention and research procedures, a meeting was held with students' parents or caregivers to provide information about the crisis intervention and the research study.

Students who experienced fainting spells (all females) received crisis intervention from the mental health team. Following the clinical interview and intervention, students for whom the caregiver provided informed consent were administered questionnaires to evaluate symptoms of anxiety and their personality profile. The interview was conducted by a member of the team (psychiatrists, psychologists, and psychiatric technicians). All interviews were completed within 2 days after the ECB was reported by the class/group. During the next 2 months, follow-up assessments were conducted.

Evaluation instruments

Sociodemographic assessment.—Participants self-reported gender, age, and neighborhood of residence (neighborhood where the school was located or other), having sexual intercourse and romantic relationship history in the last 15 days.

Clinical data.—Participants reported personal history of ECB, alcohol use, and the use of traditional medicines. Past 2 weeks alcohol and drug use history was evaluated to explore potential relations between ECB and drug intoxication or withdrawal.

Anxiety symptoms (continuous measure).—The Portuguese version (Quintão et al., 2013) of the 21-item Beck Anxiety Inventory (Beck et al., 1988) was used to evaluate levels of anxiety. Total scores range between 0 and 63, where greater scores represent greater levels of anxiety.

Personality traits (continuous measures).—The Portuguese version (Almiro & Simões, 2016) of the 70-item Eysenck Personality Questionnaire-Revised (EPQR) scale assessed four personality dimensional categories: neuroticism (23 items), extroversion (20 items), psychoticism (9 items), and sincerity (18 items). A total score was calculated for each dimension (one point per item endorsed).

Data analysis

We first present bivariate logistic regression models where we examined the association between the following predictors: age, neighborhood of residence, previous crisis, being in a romantic relationship, having sexual intercourse in the last 15 days, consumption of alcohol, drugs, and traditional medicines, and ECB. We then present bivariate logistic regression models where we examined the association between clinical characteristics – anxiety levels and personality profiles – and ECB. Finally, we performed a multivariate logistic regression model including all the variables for which the bivariate analysis provided strong evidence of an association with ECB (as determined by a $p < .05$). A significance parameter of $p < .05$ (two-tailed) was applied for all tests. All analyses were conducted using SPSS version 22 for Windows.

Results

Sociodemographic characteristics

The sample included 154 female participants with a mean age of 17.16 (*SD* = 1.46). ECB was reported by 57 (37.0%) participants, whereas 97 (63.0%) had not presented ECB. Table 1 present sample characteristics and the bivariate association between sociodemographic and psychosocial characteristics and ECB. As shown in Table 1, having a romantic relationship, and having sexual intercourse in the last 15 days, reduced odds of ECB. No association were found between age, neighborhood of residence and ECB (Table 1).

Clinical data and ECB

As seen in Table 1, previous episodes of ECB, predominantly at home or other locations, were associated with ECB. In this sample, the consumption of alcohol in 10 (6.5%) and traditional medicines in 6 (3.9%) girls were low and no participant had a history of drug use. Alcohol consumption (OR = 0.71, 95% CI [0.18, 2.88]; $p = .64$), use of traditional medicines (OR = 1.76, 95% CI [0.42, 7.31]; $p = .44$) and drug use were not associated with ECB.

Relationship between anxiety, personality profiles, and ECB

In Table 2 we present the distribution of anxiety levels and personality profiles and their unadjusted relationships with ECB. Participants with ECB presented higher anxiety levels than participants without ECB. Higher levels of anxiety increased by 8% the likelihood of ECB. Concerning to personality profiles, participants presenting ECB had higher levels of extroversion, neuroticism, psychoticism, and sincerity than participants without ECB. In unadjusted regression models, we detected associations between personality profiles and ECB. Extroversion personality profile levels increased the odds of ECB by 21%, neuroticism levels by 13%, psychoticism levels by 13%, and sincerity levels by 14%.

Logistic regression model adjusting for previous ECB, relationship, anxiety levels, and personality profiles

Table 3 shows the results of the multivariate logistic regression model constructed with all the variables for which we found evidence of an association with having ECB in the bivariate analysis ($p < 0.05$). Those variables were having previous ECB, having a romantic relationship, sexual intercourse in the past 15 days, anxiety levels, and personality profiles. Adjusting for all relevant variables in the model, previous ECB, extroverted personality, and having a relationship remained associated with ECB. Previous ECB increased odds of current ECB by 8.3 times, while having extroverted personality was associated with increased odds of ECB by 15%, and having a relationship reduced the odds of having ECB by 96% (Table 3).

Discussion and conclusion

The present study aimed to determine the relationship between socio-demographic factors, personality feature, and presence of anxiety symptoms with emotional contagious behavior among school girls. ECB was associated with higher levels of anxiety, neuroticism, psychoticism, sincerity, and extroversion. When the different factors were considered

together, previous ECB and absence of relationships were independent predictors of having ECB. Emotional contagion is not a recent phenomenon of humanity (Pringle, 2015; Trimble & Reynolds, 2016). Similar cases were reported in several countries (Halvorson et al., 2008; Haque et al., 2013; Kokota, 2011). Cases frequently have a common aspect, which is the presence of a belief of the probable cause of ECB (Ventriglio & Bhugra, 2017). For example, a study in Bangladesh (Haque et al., 2013) described cases of children who developed gastrointestinal symptoms (abdominal pain), chest pain, and changes in taste after eating biscuits. The reasons for the symptoms were attributed to the black color of the biscuit packaging, interpreted as 'devil deed', as the cause of the crisis. This example differs from our study because the crisis was attributed to a food whereas in our study the belief was possession by evil spirits. In addition, different from other studies, we did not use standardized instrument for the evaluation of the ECB phenomenon and symptoms.

In African countries, the possession by spirits and beliefs of witchcraft, are frequently main causes of emotional contagion (Kokota, 2011) or collective hysteria.

In a study carried out in Latin America, the adolescents presented motor complaints (gait difficulty): the perception of the cause of the crisis was the presence of evil spirits and Satan (Loa Zavala, 2010). This study, like ours, was conducted in a suburban area and anxiety was an important factor in the development of seizures. It differs from our study, due to the context in which it took place, a Christian school with a strong religious belief, and by the fact that standardized instruments for the measurement of symptoms had not been administered. A study done in the United States of America revealed the development of crises of collective hysteria (Halvorson et al., 2008) during a school evaluation week. This finding is related to ours regarding the academic season in which it occurred but differs in complaints: dermatological (pruritus) were presented so environmental composition analyzes (gases and toxins) were made whereas in ours, standardized psychological assessment instruments was the main tool for the presented symptoms.

The group of students who developed the symptoms had significantly higher levels of anxiety in relation to students who did not present ECB. This finding is in line with results from other studies (Govender, 2014; Halvorson et al., 2008) and, however, we cannot compare the results with our findings by the following factors: (a) the Govender's (2014) study, despite having convenience sampling, does not present a control group; (b) in the study by Halvorson et al. (2008) they did not use screening or assessment tool to measure symptoms of anxiety but they did medical evaluations and extensive environmental investigations. In our study, the Beck Anxiety Scale was applied, whereas in both studies, no standardized instrument for measuring anxiety symptoms was used.

The students who developed the symptoms presented significant differences in levels of personality traits of extroversion, neuroticism, psychoticism, and sincerity compared with the young girls who did not have ECB. These findings are consistent with an earlier study (Frankel, 1976), which however, presented a case report and did not used standardized instruments for personality evaluation. Although our findings suggest important the factors potentially associated with this phenomenon, the mechanism of emotional contagion is not yet well known (Gump & Kulik, 1997).

The main strength of our study is the fact that ECB is a rare event and we measured anxiety symptoms and personality traits using a standardized instrument to better understand the psychological profile of the participants. Nevertheless, our study presents several limitations. First, the sampling was of convenience which can increase the risk of selection bias. Second, our study is observational and cross-sectional. It was not possible to control confounding factors to establish the cause of the ECB or to study the development of the phenomenon in a prospective way. Third, the study was carried out as part of crisis intervention, and not to elucidate more broadly risk factors involved in the ECB. Further longitudinal studies should be conducted in the community, with qualitative approaches to better understand the cultural perception of the phenomenon. Additionally, it would be advisable to conduct studies to explore the influence of factors related to one's sexuality such as relationship with peer and sexual behavior intercourse and experience, as well as personality traits in the development of symptoms of collective emotional crisis behavior.

Taking into account the results, it is important to bring data to understand the complexity of this phenomenon, so as to educate all people involved (parents, teachers, community, and media) in the best way of acting so as not to facilitate or prolong the episodes. Parallel to this, public health may benefit from a more pragmatic understanding of the nature of this phenomenon in order to adopt more appropriate measures in the prevention and early intervention as a way to mitigate the debilitating impact of its occurrence. Hence, actions for promotion of well-being among young people should be considered from a public health point of view and education for better psychosocial development in adolescence, an important stage of life.

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Table 1.

Bivariate association between sociodemographic and psychosocial characteristics and ECB.

Variables	ECB			OR [95% CI]	*p*-value*
	Yes *n* (%)	No *n* (%)	Total *n* (%)		
Sample	57 (37.0)	97 (63.0)	154 (100.0)		
History of ECB					
Yes	28 (49.1)	12 (12.4)	**40 (26.0)**	**6.84 [3.08, 15.17]**	**<.001**
No	29 (50.9)	85 (87.6)	**114 (74.0)**		
Has/had romantic relationship					
Yes	4 (7.0)	58 (59.8)	**62 (40.3)**	**0.05 [0.02, 0.15]**	**<.001**
No	53 (93.0)	39 (25.3)	**92 (59.7)**		
Had/has sexual intercourse					
Yes	2 (3.5)	20 (20.6)	**22 (14.3)**	**0.14 [0.03, 0.62]**	**.010**
No	55 (96.5)	77 (79.4)	132 (85.7)		
Use of traditional medicine					
Yes	2 (3.5)	4 (4.1)	6 (3.9)	1.76 [0.42, 7.31]	.44
No	55 (96.5)	93 (95.9)	148 (96.1)		
Alcohol consumption					
Yes	3 (5.3)	7 (7.2)	10 (6.5)	0.71 [0.18, 2.88]	.64
No	54 (94.7)	90 (92.8)	144 (93.5)		

*Results in bold had a $p < .05$.

Table 2.

Bivariate association between anxiety levels, personality profiles, and ECB.

Anxiety and personality profile	ECB			
	Positive (*n* = 57)	**Absence (*n* = 97)**	**Odds ratio [95% CI]**	***p*-Value**
	M* ± *SD	***M* ± *SD***		
Beck Anxiety Inventory (BAI)	24.02 ± 12.21	13.54 ± 10.21	1.08 [1.05, 1.12]	<**.001**
EPQR extroversion	11.67 ± 5.32	7.10 ± 4.19	1.21 [1.12, 1.31]	<**.001**
EPQR neuroticism	12.59 ± 5.63	9.56 ± 4.62	1.13 [1.05, 1.21]	**.001**
EPQR psychoticism	10.82 ± 5.24	6.99 ± 5.51	1.13 [1.06, 1.21]	<**.001**
EPQR sincerity	13.26 ± 4.24	10.98 ± 4.33	1.14 [1.05, 1.23]	**.002**

Results in bold had a $p < .05$.

Table 3.

Multivariate logistic regression model adjusting for previous ECB relationship and sexual intercourse, anxiety levels, and personality profile (n = 154).

Predictors	**ECB**	***p*-Value**
	Odds ratio [95% CI]	
Previous ECB	8.28 [2.51, 27.30]	**.001**
Relationship	0.04 [0.01, 0.19]	<**.001**
Intercourse	1.43 [0.19, 10.76]	.73
Anxiety level	1.04 [0.99, 1.09]	.095
Extroversion	1.15 [1.01, 1.30]	**.038**
Neuroticism	0.97 [0.87, 1.09]	.58
Psychosis	1.01 [0.92, 1.11]	.76
Sincerity	1.03 [0.89, 1.18]	.68

Results in bold had a $p < .05$.