

Psychological Trauma: Theory, Research, Practice, and Policy

Predicting Who Will Dissociate during a Traumatic Event and Who Will Develop PTSD

--Manuscript Draft--

| | |
|--|--|
| Manuscript Number: | |
| Full Title: | Predicting Who Will Dissociate during a Traumatic Event and Who Will Develop PTSD |
| Article Type: | Article (masked) |
| Keywords: | dissociation, peritraumatic dissociation, PTSD, trauma, traumatic load |
| Corresponding Author: | Paula Errazuriz, Ph.D. Pontificia Universidad Catolica de Chile CHILE |
| Corresponding Author Secondary Information: | |
| Corresponding Author's Institution: | Pontificia Universidad Catolica de Chile |
| Corresponding Author's Secondary Institution: | |
| First Author: | Paula Errazuriz, Ph.D. |
| First Author Secondary Information: | |
| Order of Authors: | Paula Errazuriz, Ph.D. |
| | Rodrigo Figueroa, M.D. |
| | Martin Fritzsche |
| Order of Authors Secondary Information: | |
| Manuscript Region of Origin: | CHILE |
| Abstract: | <p>Objectives: The current study focused on better understanding the role of peritraumatic dissociation by predicting which subjects would develop peritraumatic dissociation, assessing the role of peritraumatic dissociation as a predictor of PTSD symptomatology, and testing a mediational model with peritraumatic dissociation mediating between traumatic load and PTSD symptomatology. Participants: Fifty-seven adults who attended the ER after experiencing or witnessing a traumatic event. Methods: Secondary analysis of an RCT that took place in the emergency rooms of general hospitals in Santiago de Chile. Results: Almost half (45.61%) of individuals who had suffered a traumatic event met criteria for PTSD a month later. Individuals with greater dissociative symptomatology during a traumatic event presented greater PTSD symptomatology a month later. Those who had suffered more traumatic events in their life, and those who were less educated, were more likely to present peritraumatic dissociation. We did not find that peritraumatic dissociation was significantly predicted by age, sex, and social support. We could not prove that dissociation mediates between traumatic load and PTSD symptoms. Conclusion: Our results draw to the importance of identifying persons who dissociate most during a traumatic event since this may help predict the development of PTSD symptomatology. In addition, when a large number of persons has been affected by a traumatic event - such as in the aftermath of a natural disaster-, it would be relevant to screen first those with a higher traumatic load and lower education due to their higher risk to dissociate.</p> |
| Suggested Reviewers: | Veronica Vitriol, M.D. Universidad de Talca vvitriol@hospitalcurico.cl Expert in trauma research |
| | Marcelo Leiva-Bianchi Universidad de Talca marcleiva@utalca.cl Expert in trauma research |
| Opposed Reviewers: | |

May 20th, 2018

Kathleen A. Kendall-Tackett, PhD
Editor, Psychological Trauma: Theory, Research, Practice, and Policy

Dear Dr. Kendall-Tackett:

Please consider the enclosed manuscript, "Predicting Who Will Dissociate during a Traumatic Event and Who Will Develop PTSD", for publication in the journal Psychological Trauma: Theory, Research, Practice, and Policy.

Using data from an RCT, with adults who attended the ER after experiencing or witnessing a traumatic event, we studied the role of peritraumatic dissociation by predicting which subjects would develop peritraumatic dissociation, assessed the role of peritraumatic dissociation as a predictor of PTSD symptomatology, and tested a mediational model with peritraumatic dissociation mediating between traumatic load and PTSD symptomatology.

Our findings show that almost half (45.61%) of individuals who had suffered a traumatic event met criteria for PTSD a month later. Individuals with greater dissociative symptomatology during a traumatic event presented greater PTSD symptomatology a month later. Those who had suffered more traumatic events in their life, and those who were less educated, were more likely to present peritraumatic dissociation. We did not find that peritraumatic dissociation was significantly predicted by age, sex, and social support. We could not prove that dissociation mediates between traumatic load and PTSD symptoms. In our conclusion we draw attention to the importance of identifying persons who dissociate most during a traumatic event since this may help predict the development of PTSD symptomatology. We also conclude that when a large number of persons has been affected by a traumatic event -such as in the aftermath of a natural disaster-, it is relevant to screen first those with a higher traumatic load and lower education due to their higher risk to dissociate. This paper is relevant for clinicians, researchers, and those who work with victims of collective trauma because it identifies important risk factors for dissociation and PTSD.

The manuscript is 22 pages long including the references list. In addition we have included four tables and one figure.

The manuscript has not been published elsewhere and is not being simultaneously submitted for publication in another journal. The study was conducted in accordance with the ethical standards of the APA. All of the authors (affiliations and contact information are below) have agreed to the byline order and to the submission of the manuscript in this form. The manuscript has been de-identified and the author note has been included in the title page.

Thank you very much for your time and consideration.

Sincerely,

Paula Errázuriz, Ph.D.
Department of Psychology
Pontificia Universidad Católica de Chile
Vicuña Mackenna 4860, Macul, Santiago, Chile
T: (562) 354 1245
paulae@uc.cl

Rodrigo Figueroa, M.D.
Psiquiatry Department
Pontificia Universidad Católica de Chile
Diagonal Paraguay 362 Of. 544, Santiago, Chile
T: (562) 354 3028
rfiguerc@uc.cl

Martín Fritzsche
School of Medicine
Pontificia Universidad Católica de Chile
Diagonal Paraguay 362 Of. 544, Santiago, Chile
fritzsche.martin@gmail.com

Title:
Predicting Who Will Dissociate during a Traumatic Event and Who Will Develop PTSD.

Authors:
Paula Errázuriz, Rodrigo Figueroa, & Martín Fritzsche

Date Submitted: 05/20/18

Contact Information:
Paula Errázuriz, Escuela de Psicología, Pontificia Universidad Católica de Chile, Vicuña Mackenna 4860, Macul, Santiago, Chile; Telephone: (569) 98242772; email: paulae@uc.cl
Address correspondence to Paula Errázuriz, Escuela de Psicología, Pontificia Universidad, Católica de Chile, Vicuña Mackenna 4860, Macul, Santiago, Chile; E-mail: paulae@uc.cl.

Running head: DISSOCIATION AND PTSD

Predicting Who Will Dissociate during a Traumatic Event and Who Will Develop PTSD

Paula Errázuriz, Psychology Department, Pontificia Universidad Católica de Chile; Rodrigo Figueroa, Psychiatry Department, Pontificia Universidad Católica de Chile; Martín Fritzsche, School of Medicine, Pontificia Universidad Católica de Chile.

Author Note

This study was supported by CONICYT (National Fund for Research and Technology), Grant N° PII20150035, with co-funding of the Fund for Innovation and Competitiveness (FIC) of the Chilean Ministry of Economy, Development and Tourism, through the Millennium Scientific Initiative, Grant N° IS130005, and by the CONICYT project FONDAP 15110017.

Running head: DISSOCIATION AND PTSD

Abstract

Objectives: The current study focused on better understanding the role of peritraumatic dissociation by predicting which subjects would develop peritraumatic dissociation, assessing the role of peritraumatic dissociation as a predictor of PTSD symptomatology, and testing a mediational model with peritraumatic dissociation mediating between traumatic load and PTSD symptomatology. **Participants:** Fifty-seven adults who attended the ER after experiencing or witnessing a traumatic event. **Methods:** Secondary analysis of an RCT that took place in the emergency rooms of general hospitals in Santiago de Chile. **Results:** Almost half (45.61%) of individuals who had suffered a traumatic event met criteria for PTSD a month later. Individuals with greater dissociative symptomatology during a traumatic event presented greater PTSD symptomatology a month later. Those who had suffered more traumatic events in their life, and those who were less educated, were more likely to present peritraumatic dissociation. We did not find that peritraumatic dissociation was significantly predicted by age, sex, and social support. We could not prove that dissociation mediates between traumatic load and PTSD symptoms. **Conclusion:** Our results draw to the importance of identifying persons who dissociate most during a traumatic event since this may help predict the development of PTSD symptomatology. In addition, when a large number of persons has been affected by a traumatic event -such as in the aftermath of a natural disaster-, it would be relevant to screen first those with a higher traumatic load and lower education due to their higher risk to dissociate. **Clinical Impact Statement:** During a traumatic event a person may suffer alterations in the experience of time, place, and person, making the traumatic event feel unreal, experience that is known as peritraumatic dissociation. Our study shows that persons who dissociate more are more likely to develop PTSD symptomatology. At the same time, those with a history of previous

traumas, and those who are less educated, are more likely to dissociate when exposed to trauma. Considering these risk factors is important for clinical practice, and for those who work with victims of collective trauma.

Key words: dissociation, peritraumatic dissociation, PTSD, trauma, traumatic load

Predicting Who Will Dissociate during a Traumatic Event and Who Will Develop PTSD

During a traumatic event an individual may suffer alterations in the experience of time, place, and person, making the traumatic event feel unreal. This way of processing information during a traumatic experience, or subsequently, has been conceptualized as traumatic dissociation (Van der Kolk, Van der Hart, & Marmar, 1996). According to Van der Kolk (2014), dissociation is the essence of trauma and refers to a compartmentalization of experience where the elements of trauma are not integrated into a sense of self or a unitary whole. The dissociative symptoms may manifest as psychological or as bodily phenomena and include disrupted memory encoding, affect compartmentalization, and time distortion and fugue.

The term “dissociation” refers to three distinct but related mental health phenomena, one of which is peritraumatic dissociation, also called “secondary dissociation” (Van der Hart, Van der Kolk, & Boon, 1996). Marmar and his colleagues (1994) have described peritraumatic dissociation as an alteration in the experience of time, place, and person that makes the occurring event seem unreal. Some of the symptoms they describe in this type of dissociation include experiencing that time is going slower or faster, depersonalization, out-of-body experiences, confusion, bewilderment, disorientation, altered perception of pain, tunnel vision, and altered body image.

Over a century ago Pierre Janet (1907) described as the main problem of severely traumatized victims the inability to emotionally process traumatic memories. According to Janet’s clinical observations, in the wake of traumatic experiences the self lacks the capacity to incorporate into its structure emotions and memories resulting from the trauma. Thus, the traumatic experience is not available to normal conscious representation, and therefore cannot be processed, persisting as a fixed idea that is split off from consciousness and distorts subsequent

experiences. Unlike normal memories, traumatic memories are not associated with an internal sense of self, and consequently, the retrieval of those memories are not under voluntary control (Bower & Sivers, 1998). Nevertheless, the sensory fragments of the traumatic experiences can be revived in consciousness when associated with external cues similar to those of the original traumatic experience, which could explain the relationship between peritraumatic dissociative experiences and intrusive thoughts or flashbacks, key symptoms of Post-Traumatic Stress Disorder (PTSD; American Psychiatric Association, 2013).

PTSD

According to the most recent version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5, American Psychiatric Association, 2013), trauma is defined as any situation of exposure to death, serious injury, or actual or threatened sexual violence, experienced directly or as a witness. Traumatic experiences produce strong emotional reactions in most people. Nevertheless, only a minority, but significant group, of those who experience a trauma will develop long-term emotional sequelae, such as PTSD (Cova, Rincon, Grandón, & Vicente, 2011). PTSD is characterized by involuntary re-experience of trauma through involuntary, almost dreamlike images, memories and/or sensations about the trauma; strong discomfort and/or need to escape from people, situations, places or things that remind of the event; fear, guilt, anger, sadness, embarrassment and/or feeling of emotional dullness (Friedman, Resick, Bryant, & Brewin, 2011). It has been reported that up to 11.8% of people attending primary care services may suffer PTSD, but their diagnosis is much lower (Wade, Howard, Fletcher, Cooper & Forbes, 2013, Grinage 2003; Stein, McQuaid, Pedrelli, Lenox & McCahill, 2000).

Unlike what was previously thought, the experience of having lived a trauma is very frequent in the life of people, varying the frequency between different countries. For example, in

a study almost 80% of the population in Mexico reported having experienced a traumatic event in their lifetime, compared to Germany, where only slightly above 20% reported the same (Norris et al., 2003; Perkonig, Kessler, Storz & Wittchen, 2000). In the United States and Australia, the figure was just over 50% (Creamer, Burgess & McFarlane, 2001; Kessler, Sonnega, Bromet, Hughes & Nelson, 1995). Chile has an intermediate situation: almost 40% of Chileans report having experienced a trauma at some point in their lives (Zlotnick et al., 2006).

The incidence of PTSD after trauma varies according to the type of trauma, its severity, duration, and the amount of time that has passed since the event occurred. In general terms, one out of seven people (14%) are described as having long-term emotional sequelae following trauma, such as PTSD, post-traumatic depression, or anxiety disorders (Kessler et al., 1995; Norris et al., 2003; Zlotnick et al., 2006). PTSD is more frequent in women than in men, with a 2:1 ratio (Breslau, 2001). Other risk factors include a low perception of social support and a high perception of post-trauma stress (Ozer, Best, Lipsey & Weiss, 2003), a high perception of vital risk during trauma, physical sequelae, and previous psychiatric history. It is important to note, however, that none of these factors increases the risk by more than 50% (Brewin, Andrews & Valentine, 2000; Ozer et al., 2003). There is also some evidence that suggests that some neurobiological markers can be related to PTSD (Auxéméry, 2012; Schönenberg, Reichwald, Domes, Badke and Hautzinger, 2008).

The results of two well-known meta-analyses (Brewin et al., 2000; Ozer et al., 2003) reveal that the variables that have been proven to be relevant predicting PTSD symptoms one month after suffering a traumatic event are the following: a) demographic variables: age, sex and education; b) non-demographics personal characteristics salient for psychological processing and

functioning: perceived social support and traumatic load; and c) aspects of the traumatic event or sequelae: dissociation and traumatic stress during the event.

Dissociative Experiences and PTSD

The relationship between dissociative experiences and PTSD is not clear from a research perspective. On one hand, there is research that finds that dissociative experiences during a traumatic event may play a critical role in the development of trauma-related psychological disorders, including PTSD (Birmes et al., 2003; Van Der Kolk et al., 1996). In addition peritraumatic emotions during a traumatic event may be associated with the development of PTSD (Bovin and Marx, 2011). Nevertheless, other studies do not find a significant association between the two (Candel and Merckelbach, 2004; Bryant, 2007).

From a theoretical perspective, there are convincing arguments about the key role that dissociative experiences play in the development of PTSD. According to van der Kolk (2014), due to dissociation the traumatic experience is split off and fragmented, causing sounds, images, emotions, thoughts, and physical sensations to be left unintegrated. These split off aspects would then intrude into the present in those who suffer PTSD. As he explains “As long as the trauma is not resolved, the stress hormones that the body secretes to protect itself keep circulating, and the defensive movements and emotional responses keep getting replayed.” (pag. 66).

In a study of over 25,000 adults from 16 countries assessed with a 12-month DSM-IV/Composite International Diagnostic Interview, Stein et al. (2013) found that dissociative symptoms were present in 14% of individuals. These symptoms were associated with high counts of re-experiencing symptoms, severe role impairment, specific phobia, and suicidality. Individuals who reported dissociative symptoms were more likely to be male, have a childhood

onset of PTSD, high exposure to traumatic events and childhood adversities, and prior histories of separation anxiety disorder.

Not everyone who undergoes a traumatic experience dissociates. Research has shown that a potential etiological factor of dissociation is that of traumatic experiences, particularly childhood abuse (see Dutra, Bureau, Holmes, & Lyubchik, 2009 for an overview). Bernstein and Putnam (1986) found among hospital admissions that of the patients who reported the highest dissociation, all of them had a history of sexual abuse, and a very high percentage also had a history of physical abuse and/or witnessing domestic violence. At the same time, a protective factor appears to be social support, since research has consistently found that having a good support network is the most powerful protection against being traumatized, and not having an adequate social support gives rise to problems such as dissociation (Van der Kolk, 2014). To the best of our knowledge, existing research has not demonstrated that age, gender, and education significantly influence dissociation (Dutra et al., 2009).

While we have advanced greatly in the understanding of dissociation, further research is necessary to understand individual characteristics that make a person more vulnerable to experiencing peritraumatic dissociation, and how this type of dissociation, as well as other individual variables, are related to the development of PTSD in the aftermath of a traumatic event.

The current study focused on better understanding the role of peritraumatic dissociation. We had three objectives: a) Predict which subjects would develop peritraumatic dissociation; b) Assess the role of peritraumatic dissociation as a predictor of PTSD symptomatology; and c) Test a mediational model with peritraumatic dissociation mediating between traumatic load and PTSD symptomatology.

Based on the previous literature we hypothesized that: a) Traumatic load would significantly predict peritraumatic dissociation even after controlling for gender, age, education, and social support; b) Peritraumatic dissociation would significantly predict the development of PTSD symptoms, even after controlling for gender, age, education, traumatic load, social support, and traumatic stress; and c) Peritraumatic dissociation would significantly mediate between traumatic load and PTSD symptoms.

Methods

Design

This is a secondary analysis of a randomized clinical trial that took place between 2015 and 2016 in the emergency rooms of general hospitals in Santiago de Chile. Adults who came to the emergency who had experienced a recent non-intentional traumatic experience (as defined by DSM-5), and who were medically able to respond to questionnaires, were invited to participate in the study. All participants signed informed consent forms, and the study was approved by the relevant ethical review boards.

Inclusion criteria: Adults (≥ 18 years old) attending the emergency service, either as a patient or companion, who had been victims of recent unintentional trauma (less than 72 hours), and who meet one of the following criteria: a) Direct victim, or witness, to a risk for life situation; or b) Direct victim, or witness, to a situation that pose a serious risk to physical integrity. Examples of these situations include serious accidents, catastrophic illnesses, highly painful medical procedures, negative medical news, natural catastrophes, fires, witnessing the violent death of another person, and explosions, among others.

Exclusion criteria were the following: a) Did not understand Spanish; b) Did not remember the traumatic experience; c) Poisoning; d) Loss of consciousness for more than five

minutes; e) Psychosis (loss of judgment of reality); f) Children and adolescents (<18 years); g) People at risk of life or medical instability requiring the implementation of life support measures incompatible with the application of measures (severe fractures, wounds with severe uncontrolled hemorrhage, unbearable pain, unstable myocardial infarction); h) Relatives of imminently impaired or newly deceased persons in the emergency department in whom the offer to participate in the investigation could cause further discomfort; i) Commitment of conscience (Glasgow 2 <15); j) Direct and indirect victim of intentional trauma (e.g., assault, abduction, sexual abuse, terrorist act, etc.); k) Patients who were vulnerable to psychiatric disorder (excluding personality disorder), in formal medical treatment (e.g., schizophrenia, mental retardation, autism, obsessive-compulsive disorder, bipolar disorder, depression, Alzheimer's, panic disorder, etc.).

As can be seen in the flow diagram (Figure 1), of 953 individuals invited to participate, 221 (23%) agreed to participate and completed time 0 (T0) self-report questionnaires. Participants were randomly assigned to the intervention Psychological First Aid (Ruzek, Brymer, Jacobs, Layne, Vernberg & Watson, 2007) and a psychoeducation control group. A month later (time 1 – T1), 57 participants completed the second data collection, which also consisted of self-report questionnaires. Because some of the analyses of the current study require T1 data, only the 57 participants that completed T0 and T1 measures were included. Data at T0 and T1 was collected by a psychologist.

Participants

Participants were 57 adults (35 female and 22 male) who attended a hospital emergency room after experiencing or witnessing a non-intentional traumatic event and who completed T0 and T1 measures. The mean age was 46.79 (SD=17.21) and the mean years of education 12.09

(SD = 3.82). Regarding the most recent trauma exposure (reason why they were in the ER), 29.82% (17) were having a serious, severe or very painful medical problem; also 29.82% (17) received in a violent manner the news of family member, or other loved one, that died or was gravely injured; 26.32% (15) had been in a vehicle accident or other type of accident; 3.51% (2) witness grave injury, and 10.53% (6) had another type of traumatic experience.

After being randomized, 110 of the subjects received an the intervention and 111 participated in a psychoeducation control group.

Measures

Traumatic Load. The Spanish version of the Trauma Questionnaire (TQ; Davidson & Smith, 1990) was administered at T0. This measure is a 19-item self-report questionnaire that quantifies the presence of stressful events during the life course. Each item receives a “yes” or “no” response. The Spanish version (Bobes et al., 2000) has demonstrated adequate test-retest reliability, discriminant validity, and concurrent validity for assessing PTSD patients. For this study, we used a total score of traumatic load, which was calculated by adding the number of traumatic experiences endorsed.

Social Support. To assess perception of social support we administered the Spanish version of the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet & Farley, 1988) at T0. This self-report measure includes 12-Likert scale items. The Spanish version (Arechabala & Miranda, 2002) demonstrated adequate psychometric properties.

PTSD Diagnosis. The Composite International Diagnostic Interview (CIDI; Robins et al., 1988) was administered at T1 to assess the presence or absence of a PTSD Diagnosis. The CIDI allows researchers to reliably assess mental disorders according to the most widely accepted nomenclatures (CIE and DSM) in many different populations and cultures. It has been found to

be appropriate for use in different settings and countries and has proven good to excellent Kappa coefficients for most diagnostic sections (Wittchen, 1994).

PTSD Symptomatology. The PTSD Check List (PCL; Weathers, Litz, Herman, Huska & Keane, 1993) assesses DSM-III-R symptoms of PTSD at T0 and T1. It is a 17-item self-reported scale with a five Likert scale levels. The original PCL measure has excellent test-retest reliability, very high internal consistency, correlates strongly with other PTSD measures, and has good diagnostic utility. For this study we used a Spanish translation of the original measure, which our team is in the process of validating.

Peritraumatic Dissociation. To assess peritraumatic dissociation during the last traumatic event (the one related to the participant's visit to the ER) we used the Peritraumatic Dissociative Experiences Questionnaire (PDEQ; Marmar, Weiss & Metzler, 1997) at T0, a 10-item self-report questionnaire. The items describe the following dissociative experiences at the time a traumatic event was occurring: losing track of time or blanking out; acting on "automatic pilot"; sensation of time changing during the event; the event seeming unreal; feeling as if floating above the scene; feeling of body distortion; confusion as to what was happening; not being aware of things that happened during the event; and disorientation. The PDEQ has demonstrated to be reliable and convergent, to have predictive validity, and be discriminant (Marmar et al., 1997). The equivalence of the English and Spanish version of the PDEQ was established by Marshall and Orlando (2002).

Peritraumatic Distress: The Peritraumatic Distress Inventory (PDI) was administered at T0 to assess symptoms of peritraumatic distress. It is a 10-item self-report questionnaire with 4-level Likert responses. The original version of the PDI was found to be internally consistent, with good convergent and divergent validity, and with good test-retest reliability (Brunet et al.,

2001). The scale was translated to Spanish by our team and we are in the process of validating it for its use in Chile.

Demographic Information: Gender, age, and years of education were collected at T0 using Section A of the Composite International Diagnostic Interview (CIDI; Robins et al., 1988).

Data Analysis Strategy

We included in our analyses the variables that are the focus of the current study, peritraumatic dissociation (T0) and PTSD symptomatology (T1), as well as other variables measured at T0 that have been found to predict PTSD (Brewin et al., 2000; Ozer et al., 2003): age, gender, education, perceived social support, traumatic load, and traumatic stress during the traumatic event. We also controlled for the intervention group that the participant had been randomized to.

We first calculated the mean and standard deviation of the former variables, and also calculated the percentage of participants who reported a history of each specific type of trauma.

Second, we calculated a Person correlation between PTSD symptoms at T1 and T0 quantitative variables. We used an independent t-test to see if there were significant differences in PTSD symptomatology based on gender. We then included all these T0 variables in a multiple regression predicting T1 PTSD symptomatology.

Third, we calculated a Person correlation between peritraumatic dissociation at T0 and the relevant T0 variables. We used an independent t-test to see if there were significant differences in peritraumatic dissociation based on gender. We then included all the T0 variables in a multiple regression predicting T0 peritraumatic dissociation.

Finally, we performed causal mediation analyses, calculating Quasi-Bayesian confidence intervals. The model was as follows: Traumatic load (T0) -> peritraumatic dissociation (T0) ->

PTSD symptomatology (T1). Because we found that education was a significant predictor of peritraumatic dissociation we also decided to add the posthoc mediation analyses with this variable: Education (T0) -> peritraumatic dissociation (T0) -> PTSD symptomatology (T1).

All analyses were performed using the statistical package R version 3.3.2.

Results

Descriptives

The mean peritraumatic dissociation score during the last traumatic event was 22.33 (SD=11.41), which is considered significant dissociation (Marmar et al., 1997; Birmes et al., 2005). The mean reported peritraumatic distress during the last traumatic event was 24.48 (SD=13.05), considered significant distress (Brunet et al., 2001; Jehel, Brunet, Paterniti & Guelfi, 2005) and the mean traumatic load (i.e., number of traumatic events experienced before the last traumatic event) was 3.11 (SD=2.12). The most commonly reported previous traumatic experiences were: unexpected death of a family member or loved one (72%), transportation accident (37%), serious threat or injury to a family member or loved one (35%), being the victim of aggression (28%), almost drowning (26%), and being in an industrial or work accident (23%).

In addition, the mean score for perceived social support was 33.37 (SD=10.62), and the mean PTSD symptomatology score at T1 was 39.53 (SD=16.23). Out of the complete sample, 26 individuals (45.61%) met criteria for PTSD one month after the traumatic event, and 31 (54.39%) did not.

Predicting Peritraumatic Dissociation

Regarding peritraumatic dissociation, we found a positive medium strength correlation with traumatic load ($r = 0.24$), a moderate negative correlation with perceived social support ($r = -0.20$), a weak negative correlation with years of education ($r = -0.12$), and a weak positive

correlation with age ($r = 0.11$). An independent t-test showed that there were no significant differences between men (22.95) and women (21.94) in their report of peritraumatic dissociation ($t = -0.32$, $df = 44.58$, $p = 0.75$).

Because peritraumatic dissociation during a traumatic event proved to be a significant predictor of PTSD, which is consistent with previous findings (Ozer et al., 2003), we tried to understand what predicts dissociation (see Table 1). For this, we used a larger sample, since we only needed T0 data. As hypothesized, peritraumatic dissociation was significantly predicted by traumatic load ($\beta = 0.82$, $SE = 0.38$, $t = 2.17$, $p = 0.032$) and years of education ($\beta = -0.96$, $SE = 0.20$, $t = -4.75$, $p = 0.0001$). Individuals who reported greater traumatic load (i.e., had suffered more traumatic events in their life), and with fewer years of education, were more likely to present peritraumatic dissociation. Gender, age, and perceived social support were not significant predictors of peritraumatic dissociation.

Predicting PTSD

Regarding PTSD symptomatology a month after the traumatic event, we found a strong positive Pearson correlation with peritraumatic dissociation ($r = 0.49$) and traumatic stress ($r = 0.49$), a moderate positive correlation with traumatic load ($r = 0.32$), a moderate negative correlation with perceived social support ($r = -0.23$), a moderate to weak negative association to education ($r = -0.19$), and a weak positive correlation with age ($r = 0.09$). We found no significant differences between men (37.23) and women (40.97) in their report of PTSD symptomatology one month after a traumatic event ($t = 0.83$, $df = 42.91$, $p = 0.41$), and also no significant differences between the intervention group (36.57) and the psychoeducation control group (42.38; $t = -1.36$, $df = 54.43$, $p = 0.18$).

Through a multiple regression, we predicted the level of PTSD symptomatology individuals reported a month after a traumatic event (see Table 2). As hypothesized, controlling for the intervention and other relevant variables, peritraumatic dissociation significantly predicted PTSD symptomatology ($\beta = 0.50$, $SE = 0.19$, $t = 2.65$, $p = 0.01$). Individuals who reported more dissociative symptomatology during a traumatic event were more likely to present greater PTSD symptomatology a month after the event. Gender, age, education, traumatic load, perceived social support, and traumatic stress during the event were not significant predictors of PTSD symptomatology.

Mediation Models

As a next logical step in trying to understand the role of peritraumatic dissociation, we tested mediational models in which each of the significant predictors of dissociation (traumatic load and education) were included as mediational variables. Contrary to our hypothesis, dissociation was not a significant mediator between traumatic load and PTSD symptomatology ($p = 0.33$; see Table 3). Also contrary to our hypothesis, dissociation was not a significant mediator between education and PTSD symptomatology ($p = 0.33$; see Table 4).

Discussion

With a medical sample of adults who attended the ER after experiencing or witnessing a traumatic event, we assessed the role of peritraumatic dissociation in the development of PTSD. In order to do this, we predicted which subjects would develop peritraumatic dissociation; assessed the role of dissociation as a predictor of PTSD symptomatology; and tested mediational models with dissociation mediating between traumatic load -and education-, and PTSD symptomatology.

Almost half (45.61%) of individuals who had suffered a traumatic event met criteria for PTSD a month later. This seems to be high considering that previous literature reports that only a minority of those who experience a trauma will develop long-term emotional sequelae such as PTSD (Cova et al., 2011). This percentage is particularly high considering that our sample excluded individuals who could not participate in the study due to the severity of their physical condition or who were receiving mental health treatment.

As hypothesized, we found that individuals with greater dissociative symptomatology during a traumatic event presented greater PTSD symptomatology a month later. This is consistent with the fact that a significant percentage of individuals who suffer PTSD report dissociative symptoms (Stein et al., 2013). This finding can be understood considering Van der Kolk's (1996; 2014) theory. According to this author, when an individual dissociates during a traumatic event, emotional and sensorial aspects of the experiences are split off from normal consciousness and cannot be normally integrated and stored in memory. Then these split off aspects intrude into the present in the form of symptoms present in PTSD, such as flashbacks and nightmares. Thus, dissociation during a traumatic event would be responsible for many of the later symptoms.

Also as hypothesized, individuals who had suffered more traumatic events in their life, were more likely to present peritraumatic dissociation. These findings are consistent with the results of two meta-analyses (Brewin et al., 2000; Ozer et al., 2003). Our results highlight the key role that past trauma history plays in the response to a new traumatic event. As previous research has shown, previous traumatic experiences increase the likelihood of dissociating during a traumatic event (Bernstein and Putnam; 1986; Dutra et al., 2009).

We also found that education was a protective factor, with persons with more years of education being less likely to present peritraumatic dissociation. This is an important finding that to the best of our knowledge has not been presented before. It may be that being more educated offers, in the extreme condition of a traumatic event, resources that allow a person to feel in control and deal with the situation without distancing the self from the experience. It could also be that specific knowledge about how to deal with the unexpected situation, or a sense of self-agency related to having knowledge in general, are protective factors.

It is also possible that in our sample individuals with less education had lower cognitive abilities and that this contributed to a greater dissociation tendency. This would be consistent with a recent review (McKinnon et al., 2016) in which the authors report that most, though not all, of the scientific evidence supports the relation between the presence of dissociative experiences and decrements in neuropsychological functioning. According to this review, both chronic dissociation, and state dissociation, would be associated with reduced performance on measures of attention, executive functioning, and memory.

Part of the impact of the predictive power that education has on how much a person experiences peritraumatic dissociation may be explained by the fact that there is an observed association between education and mental health (Halpern-Manners, Schnabel, Hernandez, Silberg, & Eaves, 2016). Moreover, years of education are known to be highly correlated with income. It is possible that more economic resources to deal with a traumatic situation (e.g., medical expenses due to an accident) make the person feel less uncertain and more in control, which could diminish the tendency to dissociate. Higher income and/or higher education may also be associated to better mental health previous to the traumatic experience, which was not measured in our study.

Contrary to previous findings (Brewin et al., 2000; Ozer et al., 2003), we did not find that peritraumatic dissociation was significantly predicted by age, sex, and perceived social support. A plausible explanation for the finding that perceived social support was not a significant predictor is the fact that data was collected right after the traumatic event, plausibly leaving no time for the person to receive social support to deal with the stressor. Nevertheless, it would be important to see if our findings are replicated with a larger sample that provides greater statistical power.

Contrary to our expectations, we could not prove that dissociation mediates between traumatic load and PTSD symptoms. Since we did find that traumatic load predicts dissociation, and the later predicts PTSD symptoms, we believe that the reason we did not find a significant mediation was the lack of statistical power. The same can be said for education: as expected, more educated patients were less likely to develop dissociation and PTSD symptoms. Nevertheless, we did not find that dissociation significantly mediates between education and PTSD symptoms. Future research should replicate both mediational models with a larger sample.

Our study had several limitations, being the main one the small size of our sample ($n = 57$). Our study also had a self-selection bias because only a small percentage of the initial sample completed the second measure, which was necessary to be included in the current study. This is particularly relevant considering that compared to patients who completed the study, those who abandoned the study between T0 and T1 were significantly more depressed at baseline ($p < .05$) and dissociated more during the traumatic experience ($p < .01$).

Our sample was from an emergency room and did not include traumatized patients that would be found in other settings. In addition, we did not include the most severe patients in the emergency room, individuals who were being treated for psychiatric conditions, those who

suffered intentional trauma, and those who for medical reasons could not participate in the study. Thus, it is not possible to know if our findings generalize to those populations. Finally, all our measures were self-report, which limits the quality of the assessments.

Nevertheless, our study also had some important strengths. We assessed several relevant psychological phenomena, collected data right after a traumatic event had occurred, and followed patients to see how their symptomatology had evolved a month later. Additionally, our study is the first to show that education can be a protective factor of peritraumatic dissociation.

We consider that this study has important clinical implications and draws to the importance of identifying persons who dissociated most during a traumatic event (e.g., earthquake), since this may help predict, and prevent if adequate help or treatment is provided, PTSD symptomatology. In addition, since we know who is at most risk for dissociating (individuals with high traumatic load and low education) it would be relevant to screen these vulnerable populations first. This information is especially relevant in contexts where a very large number of persons has been affected by a traumatic event, such as in the aftermath of a natural disaster. Considering our findings, we would suggest screening for dissociative symptoms in vulnerable populations that are more likely to include individuals who are less educated and present a history of past traumas. Once individuals who presented peritraumatic dissociation have been detected, we suggest prioritizing support and treatment options for them in order to help prevent, or diminish, the appearance of PTSD symptomatology.

References

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). Washington, DC: Author.

Arechabala Mantuliz, M. C., & Miranda Castillo, C. (2002). Validación de una escala de apoyo social percibido en un grupo de adultos mayores adscritos a un programa de hipertensión de la región metropolitana. *Ciencia y enfermería*, 8(1), 49-55.

doi: 10.4067/s0717-95532002000100007

Auxéméry, Y. (2012). L'état de stress post-traumatique comme conséquence de l'interaction entre une susceptibilité génétique individuelle, un événement traumatogène et un contexte social. *L'encéphale*, 38(5), 373-380. doi: 10.1016/j.encep.2011.12.003

Bernstein, E., & Putman, F. (1986). Development, Reliability, and Validity of a Dissociation Scale. *The Journal Of Nervous And Mental Disease*, 174(12), 727-735.

doi:10.1097/00005053-198612000-00004

Birmes, P., Brunet, A., Benoit, M., Defer, S., Hatton, L., Sztulman, H., & Schmitt, L. (2005). Validation of the Peritraumatic Dissociative Experiences Questionnaire self-report version in two samples of French-speaking individuals exposed to trauma. *European Psychiatry*, 20(2), 145-151. doi: 10.1016/j.eurpsy.2004.06.033

Birmes, P., Brunet, A., Carreras, D., Ducassé, J., Charlet, J., & Lauque, D. et al. (2003). The Predictive Power of Peritraumatic Dissociation and Acute Stress Symptoms for Posttraumatic Stress Symptoms: A Three-Month Prospective Study. *American Journal Of Psychiatry*, 160(7), 1337-1339. doi: 10.1176/appi.ajp.160.7.1337

Breslau, N. (2001). The epidemiology of posttraumatic stress disorder: What is the extent of the problem? *The Journal of Clinical Psychiatry*, 62 Suppl 17, 16-22.

- Brewin, C., Andrews, B., & Valentine, J. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal Of Consulting And Clinical Psychology*, 68(5), 748-766. doi: 10.1037//0022-006x.68.5.748
- Brunet, A., Weiss, D., Metzler, T., Best, S., Neylan, T., & Rogers, C. et al. (2001). The Peritraumatic Distress Inventory: A Proposed Measure of PTSD Criterion A2. *American Journal Of Psychiatry*, 158(9), 1480-1485. doi: 10.1176/appi.ajp.158.9.1480
- Bryant, R. (2007). Does dissociation further our understanding of PTSD?. *Journal Of Anxiety Disorders*, 21(2), 183-191. doi: 10.1016/j.janxdis.2006.09.012
- Bobes, J., Calcedo-Barba, A., García, M., Francois, M., Rico-Villademoros, F., González, M. P., & Bousoño, M. (2000). Evaluación de las propiedades psicométricas de la versión española de cinco cuestionarios para la evaluación del trastorno de estrés postraumático. *Actas Esp Psiquiatr*, 28(4), 207-218.
- Bovin, M., & Marx, B. (2011). The importance of the peritraumatic experience in defining traumatic stress. *Psychological Bulletin*, 137(1), 47-67. doi: 10.1037/a0021353
- Bower, G., & Sivers, H. (1998). Cognitive impact of traumatic events. *Development And Psychopathology*, 10(4), 625-653. doi: 10.1017/s0954579498001795
- Candel, I., & Merckelbach, H. (2004). Peritraumatic dissociation as a predictor of post-traumatic stress disorder: a critical review. *Comprehensive Psychiatry*, 45(1), 44-50. doi: 10.1016/j.comppsy.2003.09.012
- Cova, F., Rincón, P., Grandón, P., & Vicente, B. (2011). Controversias respecto de la conceptualización del trastorno de estrés postraumático. *Revista Chilena De Neuro-psiquiatría*, 49(3), 288-297.

Creamer, M., Burgess, P., & McFarlane, A. (2001). Post-traumatic stress disorder: findings from the Australian National Survey of Mental Health and Well-being. *Psychological Medicine*, 31(07). doi: 10.1017/s0033291701004287

Davidson, J., & Smith, R. (1990). Traumatic experiences in psychiatric outpatients. *Journal Of Traumatic Stress*, 3(3), 459-475. doi: 10.1007/bf00974785

Dutra, L., Bureau, J., Holmes, B., Lyubchik, A., & Lyons-Ruth, K. (2009). Quality of Early Care and Childhood Trauma. *The Journal Of Nervous And Mental Disease*, 197(6), 383-390. doi: 10.1097/nmd.0b013e3181a653b7

Friedman, M. J., Resick, P. A., Bryant, R. A., & Brewin, C. R. (2011). Considering PTSD for DSM-5. *Depression and Anxiety*, 28(9), 750-769. doi:10.1002/da.20767.

Grinage, B. D. (2003). Diagnosis and management of post-traumatic stress disorder. *Am Fam Physician*, 68(12), 2401-8.

Halpern-Manners, A., Schnabel, L., Hernandez, E., Silberg, J., & Eaves, L. (2016). The Relationship between Education and Mental Health: New Evidence from a Discordant Twin Study. *Social Forces*, 95(1), 107-131. doi: 10.1093/sf/sow035

Janet P (1907): The Major Symptoms of Hysteria: Fifteen Lectures Given in the Medical School of Harvard University. New York: MacMillan.

Jehel, L., Brunet, A., Paterniti, S. & Guelfi, J. (2005). Validation de la version française de l'inventaire de détresse péritraumatique. *The Canadian Journal of Psychiatry*, 50(1), pp.67-71.

Kessler, R. (1995). Posttraumatic Stress Disorder in the National Comorbidity Survey. *Archives Of General Psychiatry*, 52(12), 1048. doi: 10.1001/archpsyc.1995.03950240066012

Marmar CR, Weiss DS, Metzler TJ. The Peritraumatic Dissociative Experiences Questionnaire. In: Wilson JP, Keane TM, editors. Assessing psychological trauma and posttraumatic stress disorder. New York: The Guilford Press; 1997.p. 412–28.

Marmar, C. R., Weiss, D. S., Schlenger, W. E., Fairbank, J. A., Jordan, B. K., Kulka, R. A., & Hough, R. L. (1994). Peritraumatic dissociation and posttraumatic stress in male Vietnam theater veterans. *American journal of Psychiatry*, 151(6), 902-907. DOI:10.1176/ajp.151.6.902

Marshall, G. N. & Orlando, M. (2002). Acculturation and peritraumatic dissociation in young adult Latino survivors of community violence. *Journal of Abnormal Psychology*, 111(1), 166. dx.doi.org/10.1037/0021-843X.111.1.166

McKinnon, M. C., Boyd, J. E., Frewen, P. A., Lanius, U. F., Jetly, R., Richardson, J. D., & Lanius, R. A. (2016). A review of the relation between dissociation, memory, executive functioning and social cognition in military members and civilians with neuropsychiatric conditions. *Neuropsychologia*, 90, 210-234. doi:10.1016/j.neuropsychologia.2016.07.017

Norris, F. H., Murphy, A. D., Baker, C. K., Perilla, J. L., Rodriguez, F. G., & Rodriguez, J. d. e. . J. (2003). Epidemiology of trauma and posttraumatic stress disorder in mexico. *J Abnorm Psychol*, 112(4), 646-56. doi:10.1037/0021-843X.112.4.646.

Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin*, 129(1), 52-73. dx.doi.org/10.1037/0033-2909.129.1.52

Perkonigg, A., Kessler, R. C., Storz, S., & Wittchen, H. U. (2000). Traumatic events and post-traumatic stress disorder in the community: Prevalence, risk factors and comorbidity. *Acta Psychiatrica Scandinavica*, 101(1), 46-59. doi.org/10.1034/j.1600-0447.2000.101001046.x

Robins, L. N., Wing, J., Wittchen, H. U., Helzer, J. E., Babor, T. F., Burke, J., ... & Sartorius, N. (1988). The Composite International Diagnostic Interview: an epidemiologic instrument suitable for use in conjunction with different diagnostic systems and in different cultures. *Archives of general psychiatry*, 45(12), 1069-1077.

doi:10.1001/archpsyc.1988.01800360017003

Ruzek, J. I., Brymer, M. J., Jacobs, A. K., Layne, C. M., Vernberg, E. M., & Watson, P. J. (2007). Psychological First Aid. *Journal Of Mental Health Counseling*, 29(1), 17-49.

doi:10.17744/mehc.29.1.5racqxjueafabgwp

Schönenberg, M., Reichwald, U., Domes, G., Badke, A. and Hautzinger, M. (2008). Ketamine aggravates symptoms of acute stress disorder in a naturalistic sample of accident victims. *Journal of Psychopharmacology*, 22(5), 493-497. doi:10.1177/0269881107082481

Stein, D., Koenen, K., Friedman, M., Hill, E., McLaughlin, K., Petukhova, M., Ruscio, A., Shahly, V., Spiegel, D., Borges, G., Bunting, B., Caldas-de-Almeida, J., de Girolamo, G., Demyttenaere, K., Florescu, S., Haro, J., Karam, E., Kovess-Masfety, V., Lee, S., Matschinger, H., Mladenova, M., Posada-Villa, J., Tachimori, H., Viana, M. and Kessler, R. (2013).

Dissociation in Posttraumatic Stress Disorder: Evidence from the World Mental Health Surveys. *Biological Psychiatry*, 73(4), p.302-312. doi:10.1016/j.biopsych.2012.08.022

Stein, M. B., McQuaid, J. R., Pedrelli, P., Lenox, R., & McCahill, M. E. (2000). Posttraumatic stress disorder in the primary care medical setting. *General Hospital Psychiatry*, 22(4), 261-9. doi.org/10.1016/S0163-8343(00)00080-3

Van der Kolk BA, van der Hart O, Marmar CR. Dissociation and information processing. In: Van Der Kolk BA, Mcfarlane AC, Weisaeth L, editors. *Traumatic stress*. New York: The Guilford Press. 1996. p. 303–27.

- Van Der Kolk, B. (2014). *The body keeps the score*. New York, NY: Viking.
- Wade, D., Howard, A., Fletcher, S., Cooper, J., & Forbes, D. (2013). Early response to psychological trauma--what GPs can do. *Australian family physician*, 9, 610–614.
- Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (1993, October). *The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility*. Presented at the Annual Convention of the International Society for Traumatic Stress Studies, San Antonio, TX.
- Wittchen, H. U. (1994). Reliability and validity studies of the WHO-Composite International Diagnostic Interview (CIDI): a critical review. *Journal of psychiatric research*, 28(1), 57-84. doi.org/10.1016/0022-3956(94)90036-1
- Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal of personality assessment*, 52(1), 30-41. doi.org/10.1207/s15327752jpa5201_2
- Zlotnick, C., Johnson, J., Kohn, R., Vicente, B., Rioseco, P., & Saldivia, S. (2006). Epidemiology of trauma, post-traumatic stress disorder (PTSD) and co-morbid disorders in chile. *Psychol Med*, 36(11), 1523-33. doi:10.1017/S0033291706008282.

Tables and Figures

Table 1. Predicting peritraumatic dissociation

| Coefficients | Estimate | Std. Error | t value | Pr(> t) | Signif. |
|----------------|----------|------------|---------|----------|---------|
| (Intercept) | 40.67025 | 5.08483 | 7.998 | 0.0001 | *** |
| Traumatic Load | 0.81886 | 0.37829 | 2.165 | 0.0317 | * |
| Sex Male | -1.82539 | 1.65695 | -1.102 | 0.272 | |
| Age | -0.01543 | 0.05329 | -0.29 | 0.7724 | |
| Education | -0.95519 | 0.20126 | -4.746 | 0.0001 | *** |
| Social Support | -0.12469 | 0.08393 | -1.486 | 0.139 | |

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1; Residual standard error: 11.16 on 187 degrees of freedom; Multiple R-squared: 0.1637; Adjusted R-squared: 0.1414; F-statistic: 7.323 on 5 and 187 DF, p-value: 2.731e-06

Table 2: Predicting PTSD symptomatology one month after a traumatic event

| Coefficients | Estimate | Std. Error | t value | Pr(> t) | Signif. |
|-------------------------------|----------|------------|---------|----------|---------|
| (Intercept) | 22.23911 | 11.83683 | 1.879 | 0.066 | . |
| Gender - Male | -6.67248 | 3.60394 | -1.851 | 0.0699 | . |
| Age | 0.06981 | 0.10002 | 0.698 | 0.4884 | |
| Education | -0.34509 | 0.46615 | -0.74 | 0.4625 | |
| Intervention – Psicoeducation | 7.11858 | 3.3709 | 2.112 | 0.0396 | * |
| Traumatic Load | 1.35894 | 0.85259 | 1.594 | 0.1171 | |
| Social Support | -0.14133 | 0.17714 | -0.798 | 0.4287 | |
| Dissociation | 0.50479 | 0.19079 | 2.646 | 0.0108 | * |
| Traumatic Stress | 0.27729 | 0.16687 | 1.662 | 0.1027 | |

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1; Residual standard error: 12.88 on 51 degrees of freedom; Multiple R-squared: 0.4458; Adjusted R-squared: 0.3589; F-statistic: 5.129 on 8 and 51 DF, p-value: 0.0001028.

Table 3: Peritraumatic dissociation as a mediator between traumatic load and PTSD

| | Estimate | 95% CI Lower | 95% CI Upper | p-value |
|----------------|----------|--------------|--------------|---------|
| ACME | 0.588 | -0.389 | 2.058 | 0.25 |
| ADE | 1.331 | -1.435 | 4.105 | 0.34 |
| Total Effect | 1.919 | -0.945 | 4.674 | 0.18 |
| Prop. Mediated | 0.234 | -1.787 | 2.831 | 0.33 |

Sample Size Used: 57; Simulations: 10000

Table 4: Peritraumatic dissociation as a mediator between years of education and PTSD

| | Estimate | 95% CI Lower | 95% CI Upper | p-value |
|----------------|----------|--------------|--------------|---------|
| ACME | 0.599 | -0.369 | 2.057 | 0.25 |
| ADE | 1.338 | -1.468 | 4.137 | 0.35 |
| Total Effect | 1.936 | -0.978 | 4.762 | 0.18 |
| Prop. Mediated | 0.235 | -1.749 | 3.032 | 0.33 |

Sample Size Used: 57; Simulations: 10000

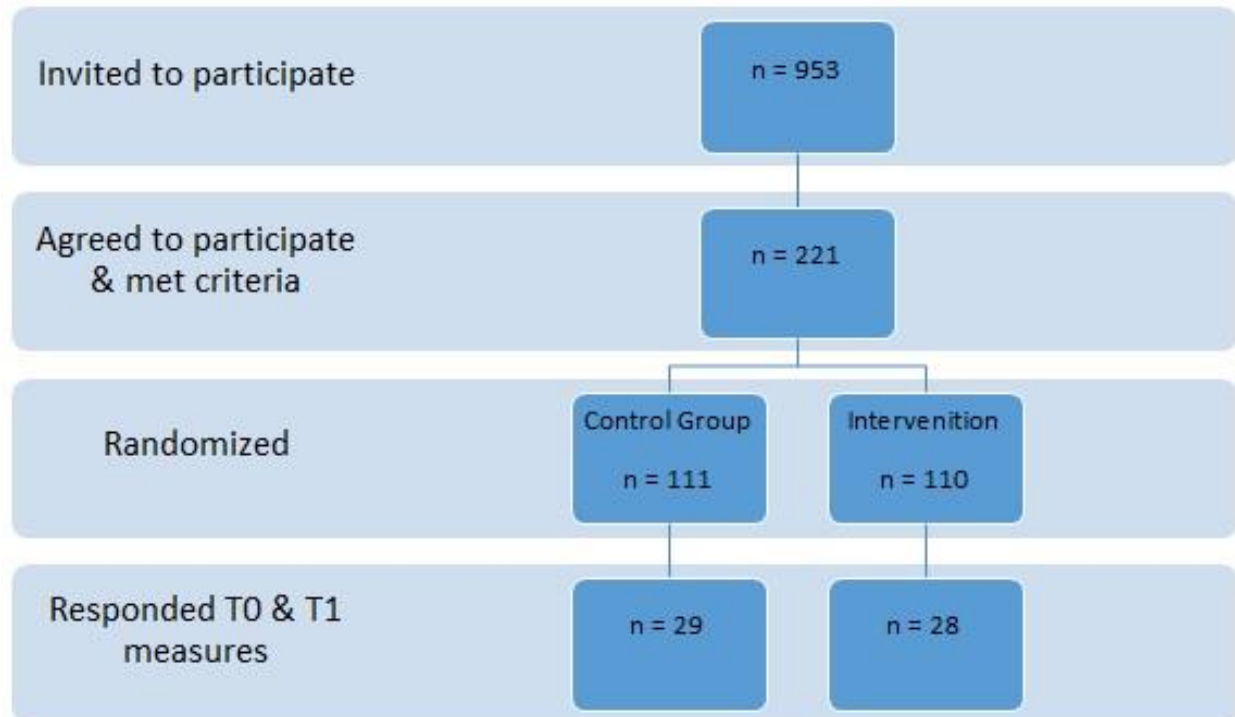


Figure 1: Flow diagram of participants