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**ITALO FELIPE GUILHERME ALMEIDA PRADO**

**LIST EXPERIMENT AND MISREPORTING OF SEXUAL VIOLENCE IN BRAZIL**

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ITALO FELIPE GUILHERME ALMEIDA PRADO

LIST EXPERIMENT AND MISREPORTING OF SEXUAL VIOLENCE IN BRAZIL

Dissertação submetida ao Programa de Pós-Graduação em Economia da Universidade Federal do Ceará, como requisito parcial à obtenção do título de mestre em Economia. Área de Concentração: Economia

Orientador: Prof. Dr. José Raimundo de Araújo Carvalho Júnior

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BANCA EXAMINADORA

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Prof. Dr. José Raimundo de Araújo Carvalho  
Júnior (Orientador)  
Universidade Federal do Ceará (UFC)

---

Prof. Dr. Diego de Maria André  
Universidade Federal do Rio Grande do Norte  
(UFRN)

---

Prof. Dr. Victor Hugo de Oliveira Silva  
University of East Anglia (UEA)

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## ABSTRACT

This paper aims to analyze the potential omission and misreporting from women victims of sexual violence committed by perpetrators other than the intimate partner or ex-partner. For this, the List Experiment method has been applied to a sample of 4,746 women who participated in the PCSVDF-Mulher in 2019 along seven Brazilian capitals (Fortaleza, Recife, Salvador, Porto Alegre, São Paulo, Goiânia and Belém). The results of the experiment indicated an estimated prevalence of sexual violence of about 4.1%, however, no sensitivity bias or misreporting was found. Furthermore, results based on econometric models estimated by Maximum Likelihood indicated that older women and more educated women were more likely to omit the sexual violence suffered when asked directly, in contrast to questioning via the list experiment, whose reports were higher. Likewise, women from São Paulo were more likely to omit, whereas women from Recife, Salvador and Goiânia tended to omit less, indicating possible heterogeneities among the cities. These results, therefore, suggest initial policy prescriptions by pointing out which groups of sexual violence victims public authorities and services should give more attention to at the time of the complaint in order to improve their disclosure of victimization.

**Keywords:** sexual violence; violence against women; list experiment; sensitive questions.

## RESUMO

Este trabalho buscar analisar a potencial omissão e o relato impreciso de mulheres vítimas de violência sexual cometida por outros perpetradores que não sejam o parceiro ou ex-parceiro íntimos. Para isto, o método do Experimento de Lista foi aplicado a uma amostra de 4.746 mulheres que participaram da PCSVDF-Mulher em 2019 em sete capitais brasileiras (Fortaleza, Recife, Salvador, Porto Alegre, São Paulo, Goiânia e Belém). Os resultados do experimento apontaram uma prevalência estimada de violência sexual de cerca de 4,1%, no entanto, não foi encontrado viés de sensibilidade ou relato impreciso. Além disso, os resultados baseados em modelos econométricos estimados por Máxima Verossimilhança apontaram que mulheres mais velhas e mulheres mais instruídas apresentaram maiores probabilidades de omitir a violência sexual sofrida quando questionadas diretamente, ao contrário do questionamento através do experimento de lista, cujos relatos foram maiores. Da mesma forma, mulheres de São Paulo foram mais propensas a omitir, enquanto que mulheres de Recife, Salvador e Goiânia tenderem a omitir menos, indicando possíveis heterogeneidades entre as cidades. Estes resultados, portanto, sugerem prescrições políticas iniciais, apontando quais os grupos de vítimas de violência sexual a que as autoridades e serviços públicos devem dar mais atenção no momento da denúncia, a fim de melhorar o seu relato de vitimização.

**Palavras-chave:** violência sexual; violência contra mulheres; experimento de lista; questões sensíveis.



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## 1 INTRODUCTION

Violence against women can be understood as one of the most persistent and urgent global public health and human rights violation problems (GARCIA-MORENO *et al.*, 2005; KRANTZ; GARCIA-MORENO, 2005). Overcoming it is essential for social development and is part of one of the Sustainable Development Goals of the United Nations (UN), specifically Goal 5 on gender equality. However, reality has demonstrated that this challenge is far from being overcome, especially in cultures and societies that are still based on conservative and sexist notions (UNITED NATIONS POPULATION FUND, 2021).

There is a correlation between economic development and domestic and gender-based violence (DUFLO, 2012). Moreover, violence can be defined as “both a consequence and a cause of gender inequality” (GARCIA-MORENO *et al.*, 2005). Besides the consequences on the victims’ physical or mental health, violence against women impacts their social and economic welfare. In this sense, World Health Organization (WHO) states that this violence “negates women’s autonomy and undermines their potential as individuals and members of society” (WORLD HEALTH ORGANIZATION, 1997).

This dissertation focuses on one of the most perverse faces of violence against women: sexual violence. Moreover, previous studies report work-related drops in productivity, lack of concentration, time off, absenteeism and a decline in wages and female labor force participation associated with this violence (LOYA, 2015; SABIA *et al.*, 2013). Also, recent analyses have calculated losses around US\$110 billion and US\$3.1 trillion in the short and long term, respectively, due to sexual violence and rape in the United States (PETERSON *et al.*, 2017; PETERSON *et al.*, 2018). Such economic costs range from lost productivity and lost work days to medical and legal expenses.

However, the global understanding of the extent of sexual violence against women is still very limited. The challenge is precisely to obtain accurate and comparative data that can measure the magnitude of violence and verify which profiles of women are more vulnerable in order to adopt policies and actions to combat it (GARCIA-MORENO *et al.*, 2005). Official data from complaints made in health centers, police stations and other authorities are underestimated and reflect very little about the real magnitude of the problem (WORLD HEALTH ORGANIZATION, 1997). Thus, surveys based on individual responses have proven to be more effective (WINZER, 2016), despite not yet being globally widespread, nor directly comparable (WORLD HEALTH ORGANIZATION, 2021).

Asking questions about violence in victimization surveys is another challenge, mainly because it is a very intimate and sensitive subject for the victims. Thus, different approaches and guidelines have been created in order to minimize the negative impacts of questioning and make interviews a more trustworthy place for victims to express themselves and better report their experiences (ELLSBERG *et al.*, 2001; SMITH, 1994). In this sense, an indirect questioning method called “list experiment” was applied in this paper to measure the underreporting of sexual violence committed by people other than the intimate partner or ex-partner. It also seeks to observe which groups of women are more likely to underreport cases of sexual violence.

List experiment was developed almost 40 years ago to indirectly measure the prevalence of behaviors, attitudes and events considered sensitive (MILLER, 1984). For this, respondents are randomly divided into two groups, and each is given a same list of items, in which each person must answer how many items are true for him/her. The subtlety of the experiment lies in the fact that one of the groups receives one more item than the other, and the content of this item is the sensitive question. Thus, given some assumptions inherent in the experiment, which will be presented later, the difference between the average responses of each of the groups will provide an unbiased estimator for the true prevalence rate of the sensitive item (BLAIR; IMAI, 2012; MILLER, 1984).

This method was implemented in several sensitive topics, besides gender-based violence, such as drug consumption (MILLER, 1984), HIV-risk infection and sexual behaviors (DROITCOUR *et al.*, 1991), racial prejudice (KUKLINSKI *et al.*, 1997), blood donation (TSUCHIYA *et al.*, 2007), voter turnout (HOLBROOK; KROSNICK, 2010), along with others.

For this, data from the 3<sup>rd</sup> wave of the Socioeconomic Conditions and Domestic and Family Violence Against Women Survey — *Pesquisa de Condições Socioeconômicas e Violência Doméstica e Familiar contra a Mulher* (PCSVDF-Mulher), carried out in 2019, were used. This is a broad and representative survey, conducted in seven Brazilian capitals (Fortaleza, Recife, Salvador, Goiânia, Porto Alegre, São Paulo and Belém), that is not restricted only to violence issues but includes several socioeconomic characteristics of women such as work, income, health, among others, following the WHO guidelines, such as the use of the Conflict Tactics Scale (CTS) framework (CARVALHO *et al.*, 2018) <sup>1</sup>.

This is the first use of the list experiment to investigate the underreporting of the

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<sup>1</sup> The CTS was developed by Murray Straus to obtain more accurate data on intimate partner violence (IPV). This technique specifies violent actions classifying them according to the severity in a hierarchical order (STRAUS *et al.*, 1996).

violence in Brazilian research. Furthermore, the use of data from a survey such as the PCSVDF-Mulher must be emphasized, since Brazil has no other representative surveys that deal in depth with the problem of violence against women using self-reported responses (CARVALHO *et al.*, 2018). The country suffers from an absence of more precise data on this issue, remaining only the official data obtained from denunciations and other surveys whose coverage is reduced and cannot be extended to the entire population (WINZER, 2016).

The experiment was conducted on a sample of 4,746 women and the results indicated a prevalence rate of about 4.1% of sexual violence committed by perpetrators other than the partner or ex-partner, although no sensitivity bias or misreporting was obtained. However, according to the results of the econometric models, it was observed that older women and more educated women are more likely to omit the sexual violence suffered, similar to what has been found in other previous studies such as Agüero and Frisancho (2022), Cullen (2020) and Joseph *et al.* (2017). The results also pointed out that heterogeneities among some cities can be associated with omission.

In the next section, a brief description of definitions and specificities of sexual violence is presented, it is also addressed how difficult and problematic is to get information and data about it. Then, in Section 3 the methodology of the list experiment and its application to the PCSVDF-Mulher data are described, and some examples of the use of this approach in the context of violence against women are presented. Section 4 presents the sample data utilized and its characteristics, and, finally, results of the list experiment and the estimations and the final considerations are presented in Sections 5 and 6, respectively.

## 2 MEASURING SEXUAL VIOLENCE AGAINST WOMEN

Sexual violence against women is recognized as one of the oldest and cruelest forms of gender-based violence, which surpass borders whether political, historical, cultural or socioeconomic (MOREIRA *et al.*, 2015). Although the concept is not uniform in worldwide legislation, commonly this violence involves acts such as sexual harassment and abuse, rape and even sex trafficking. In these cases, victims cannot consent or refuse such acts due to the violence employed or their age or mental incapacity, as well as the use of drugs and other substances.

The Centers for Disease Control and Prevention (CDC) of the USA defines sexual violence as the non-consensual penetration, or the attempt, or the undesirable non-penetrative sexual contact by any perpetrator, including systematic wartime rape, sex trafficking and genital mutilation (BASILE; SMITH, 2011). In its Penal Code, Brazil defines rape and sexual violation by fraud as crimes against sexual dignity and freedom. In Article 213 of the Code, rape is defined as constraining someone, through violence or serious threat, to have carnal intercourse or to practice or allow another libidinous act to be practiced with him or her. The penalties range from 6 to 10 years in prison, up to 12 years if the victim is between 14 and 18 or the crime results in bodily harm, and up to 30 years if it results in death. Likewise, the penalty is aggravated when the victim is vulnerable, e.g. children or those incapable of consent.

This writing was made in 2009 altering the previous definition that considered rape only to constrain a woman to carnal intercourse, through violence or serious threat. Thus, until that year, for the Brazilian Judiciary System, rape was a crime that would occur exclusively through vaginal penetration and, therefore, men would not be considered victims of this violence, regardless of age. The other libidinous acts other than carnal intercourse, performed through violence or threat, were until then considered violent indecent assault. Furthermore, the same Penal Code, until 1995, stated that married women could not file a complaint against a rape they had suffered without authorization of their husbands, except when it was against him, or when they were separated (CERQUEIRA *et al.*, 2017).

An important step taken by Brazil in combating violence against women, and subsequently sexual violence, was the implementation of the Law no. 11,340 of August 7<sup>th</sup>, 2006, more known as *Maria da Penha* Law, which brought great advances such as better care and assistance for victims and tougher punishments for aggressors. According to this law, sexual violence against women is defined as:

Any behavior that forces the woman to witness, maintain or participate in unwanted sexual intercourse, by means of intimidation, threat, coercion or the

use of force; that induces the woman to commercialize or to use, in any way, her sexuality, that prevents her from using any contraceptive method or that forces her to marriage, pregnancy, abortion or prostitution, by means of coercion, blackmail, bribe or manipulation; or that limits or annuls the exercise of her sexual and reproductive rights (BRASIL, 2006).

However, historically, all these notions about sexual violence have not always been understood or socially accepted, especially in cases of intimate partner sexual violence, whose impacts are felt today in some cultures. In addition, as the United Nations Population Fund (UNPF) report points out, around 43 countries, for example, still do not have their own legislation on marital rape. Even in countries where crime is recognized, penalties can be more lenient, and they can be mitigated or even forgiven if the perpetrator marries the victim (UNITED NATIONS POPULATION FUND, 2021).

Bennice and Resick (2003) also describe that the invalidation of marital rape as a crime has its bases in 18<sup>th</sup> century Western legislation, such as Hale's doctrine, in which a woman was understood as husband's possession and that the marital commitment would give he allowed to do whatever he wanted with her. Furthermore, rape when perpetrated by another person was understood not as a crime against the woman's integrity, as a victim, but against the man and his possessions.

It is also recognized that sexual violence is often accompanied by other forms of violence such as physical and psychological. Among the injuries and physical trauma associated with this type of violence, there are also psychological and emotional sequels such as depressive symptoms and post-traumatic stress disorder, which include difficulty sleeping, flashbacks to the moment of the incident, panic and fear when reporting to someone or that all that negative experience happens again (BASILE; SMITH, 2011; BRASIL, 2015).

Moreover, feelings of guilt and shame, on the part of victims, are also among the main consequences of sexual violence, due to the situation experienced and the violence used by the perpetrator, which can also be aggravated by the environment in which the victim is inserted, and that may also affect your decision to seek help and report (BRASIL, 2015).

Therefore, overcoming sexual violence is a huge challenge. For this, it is first necessary to know and measure its magnitude, which in itself is already an arduous task because is recognized that very few victims report to authorities the violence suffered, which gives more weight to surveys and self-reported data. Thus, this section seeks to analyze and describe the difficulties in obtaining data on sexual violence, as a sensitive issue, mainly through interviews and surveys, as well as to present how incipient and disconnected the data available in Brazil are.



## 2.1 Sexual violence as a (very) sensitive question

Surveys conducted through interviews are important means of obtaining data that seek to describe the characteristics and behaviors of a given population. Furthermore, based on the information obtained, different actions or policies can be taken and/or evaluated. However, this path, which would start by obtaining data from interviews and ending with the adoption of certain actions, is not so simple and straightforward. Among the limitations, there is precisely the participant's decision to be interviewed by the survey, participating or not in all its stages, answering all the questions and even answering them sincerely.

The fact of being interviewed by itself and having to answer a survey can be considered disconcerting and often intrusive (PRYOR, 2004). This is exacerbated when dealing with sensitive issues, where the participant may feel very embarrassed or ashamed and end up not answering certain questions, or even doing so, however, lying. Questions involving sexual behavior, criminal history, drug use, personal income and citizen participation are examples recognized in the literature as sensitive questions. Despite there is no standard definition, Tourangeau *et al.* (2000) point out three aspects of sensitive questions:

1. They are intrusive questions. In other words, they are beyond what would be considered common in everyday conversations or are related to topics considered taboo by society or a specific social group. Thus, such sensitivity would be determined by the content of the question rather than situational factors such as where the question is asked or to whom it is addressed (TOURANGEAU; YAN, 2007);
2. They involve the threat of disclosure and/or breach of confidentiality. That is, the respondent's concern, even if unrealistic, with the possible consequences of providing a true answer, if the information becomes known to third parties, even those outside the survey. In addition, Pryor (2004) points out that the risks to which the respondent would suffer if his/her answers were disclosed, could be both the discomfort generated by the interview and even the possibility of the interviewee suffering sanctions, punishments or legal proceedings;
3. They are related to the concept of social desirability. That is when the respondent is asked for a response that makes him/her admit that he/she has violated a social norm, whether formal, such as laws, or informal, such as customs and cultural behaviors. Tourangeau and Yan (2007) state that the concern with social

desirability can be seen as a special case of threat of disclosure, in which a specific type of interpersonal consequence is involved, the social disapproval.

Another important point regarding sensitive questions is the fact that sensitivity is perceived differently, depending on the interviewee's view about the topic in question, as well as the social group to which they belong, in addition to the way in which the survey is carried out (YAN, 2021). For example, questions about alcohol use can be more sensitive and embarrassing to minors than adults. Likewise, in places where voting is not mandatory but is perceived as a social quality, questions about participation in elections are less sensitive for voters than for non-voters.

According to Tourangeau and Yan (2007), sensitive questions can affect three important results in a survey: overall or unit response rates (the percentage of sample members who actually participate in the survey), item non-response rates (the percentage of respondents who agree to participate in the survey but refuse to respond to a specific item) and response accuracy (the percentage of respondents who answer the questions truthfully).

Therefore, in order for the negative aspects of a sensitive question to be mitigated, the conducting of a survey must be quite elaborate. That is, it is necessary to guarantee the respondent's anonymity and confidentiality and minimize the discomfort that such questions can generate at the time of the interview. This includes assessing how questions are asked, the data collection environment, whether other people are present during the interview, and even how questions are written (TOURANGEAU; YAN, 2007; YAN, 2021).

In relation to sexual violence, it is possible to see how this issue fits into the three aspects presented by Tourangeau *et al.* (2000) on sensitive questions. As previously presented, feelings of guilt, shame, fear and panic are associated with experiences of violence and that can impact the victim's decision to report.

A woman who has suffered some type of sexual violence may feel embarrassed or ashamed to report her experience even if she may feel that such a subject is too personal or sensitive to be narrated, especially to a stranger (ELLSBERG *et al.*, 2001; SMITH, 1994). Thus, the content of the question may be considered intrusive by the woman when being interviewed in a survey. In addition, a woman may fear that her aggressor will discover her participation in an interview and, as a result, she will suffer threats and retaliation or even experience sexual violence again (ELLSBERG *et al.*, 2001; SMITH, 1994). Thus, such fear could make the woman reject participation in a survey, as well as not answer all the items or even lie about it, especially

if she lives with the aggressor.

In relation to the concept of social desirability, there is the phenomenon of blaming the victim, especially in more misogynist societies. The victimized woman is considered guilty of sexually provoking the aggressor or for not having fulfilled her role as a wife, as in the case of IPV. In addition, in these situations, due to the social context, the victims may feel or think that what they experienced is not considered violence or crime and ends up minimizing it (SMITH, 1994).

Hence, sexual violence is undoubtedly a sensitive question. The same considerations previously presented which deal with the elaboration and conduction of a survey of a sensitive nature must be observed. Ellsberg *et al.* (2001) discuss some essential characteristics for a survey on sexual violence that can influence the obtaining of information from the interviewed women, such as the wording of the questions and the clarity they should have, the interviewer's gender and their willingness to listen to the answers without judgment, the duration of the interview and the presence of others at the location.

Also, the use of more open and direct questions, such as CTS-type questions, focusing on the acts suffered, may be more effective, instead of subjective interpretations or self-administrative questions, since the respondent's perception of sexual violence may be wrong (BENNICE; RESICK, 2003; CARVALHO *et al.*, 2018; ELLSBERG *et al.*, 2001; GARCIA-MORENO *et al.*, 2005). Moreover, self-report surveys are recognized as the best way to obtain data about sexual violence, as compared to official data from complaints, as presented below.

## **2.2 National prevalence of sexual violence**

The provision of data about sexual violence, in Brazil, currently, is done almost exclusively through administrative data. Two examples are health records as the Notifiable Diseases Information System — *Sistema de Informação de Agravos de Notificação* (SINAN), belonging to the Ministry of Health, and police records gathered by the Brazilian Public Security Forum — *Fórum Brasileiro de Segurança Pública* (FBSP), presented in the Brazilian Public Security Yearbook (*Anuário Brasileiro de Segurança Pública*).

Data from SINAN are obtained through standardized notification forms filled in health services across the country. Despite its gradual implementation, in 1993, and its regulation, in 1998, this system started to receive notifications of violence only in 2009, and the compulsory notification of violence was regulated in 2011. Any suspected or confirmed cases of domestic or

intrafamily, sexual, self-inflicted violence, human trafficking, slave labor, child labor, torture, legal intervention and homophobic violence against women and men of all ages are reported (BRASIL, 2016). Moreover, cases involving minors and/or elderly people must be reported to competent authorities.

On the other hand, the FBSP is a non-governmental organization dedicated to public security issues that organizes the Brazilian Public Security Yearbook since 2007. The Yearbook is based on public information provided by security departments, such as civil, military and federal police, among other official sources. However, information and data about domestic violence were only treated in 2015, and sexual violence, in the 2019 Yearbook.

It is recognized that administrative data such as SINAN and FBSP Yearbook are inaccurate since it is necessary for the victim to report the violence suffered, and few of them are able to make the complaint (WINZER, 2016)<sup>1</sup>. Threats and blackmail by the aggressor, feelings of shame, fear and guilt, and even lack of knowledge or disbelief in available public services, among other reasons, can negatively affect victims' willingness to report.

Moreira *et al.* (2015) analyzed SINAN notifications of sexual violence against women of all ages, carried out between 2009 and 2013. Similarly, Gaspar and Pereira (2018) evaluated the evolution of sexual violence notifications from SINAN, in the same period, however considering victims of both sexes and of all age groups. Both studies found a prevalence of around 0.022% of sexual violence against women, according to the notifications of each year, considering all perpetrators without distinction between intimate partners and other aggressors.

According to the Brazilian Public Security Yearbook of 2021, in 2020, the prevalence of reported rape against women was near 0.014%, without distinguishing the perpetrator. And it is worth mentioning that these data do not measure other types of sexual violence, only rape as defined in the Penal Code (FÓRUM BRASILEIRO DE SEGURANÇA PÚBLICA, 2020).

Regarding household and self-reported surveys, Schraiber *et al.* (2007) presents the results of the WHO Multi-country Study on Women's Health and Domestic Violence against women, a household survey conducted between 2000 and 2003, in Brazil and other countries, about intimate partner violence (IPV). Analyzing data from samples of 2,128 women aged between 15 and 49 years, from the city of São Paulo and from 15 municipalities in the Zona da Mata of Pernambuco, the authors found a lifetime prevalence of sexual violence of around 10.1%

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<sup>1</sup> Also, Winzer (2020) describes some limitations of the FBSP regarding data collection in an opinion survey on sexual violence. Some of the problems pointed out by the author are the lack of a clear and precise definition of sexual violence, the use of unclear and ambiguous questions, and the lack of population representation.

and 14.3% in São Paulo and in the Zona da Mata of Pernambuco, respectively.

Another example is the National Health Survey — *Pesquisa Nacional de Saúde* (PNS) realized in 2019 by the Brazilian Institute of Geography and Statistics — *Instituto Brasileiro de Geografia e Estatística* (IBGE) and carried out with a sample of 108,525 households in some cities of all Brazilian states. The sexual violence was approached in two ways: whether the person “has been touched, manipulated, kissed or had unwillingly exposed body parts”, featuring sexual annoyance and whether the person “has been threatened or forced to have sexual intercourse or any sexual acts, against the will”, the rape’s definition. The survey finds that 8.9% of women, over 18 years old, reported having suffered sexual violence ever in their lives, but there is no identification of the aggressor.

Winzer (2016) realized a literature review with 41 articles that analyzed sexual violence in Brazil, against men and women, based on self-reported and household surveys. Among the studies evaluated, the lifetime prevalence of sexual violence against women varied between 7% and 39%. In her analysis, the author found that sexual violence is more common in young adults. Also, most studies focused on cases among women, finding greater female victimization compared to men, despite the fact that homosexual males are more prone to be victimized than heterosexuals, moreover, they were divergent on whether race had an effect on sexual violence and victimization. Among the studies analyzed by Winzer (2016), some are highlighted below.

Faúndes *et al.* (2000) analyzed experiences of sexual violence, committed by any perpetrator, in a sample of 1,838 women, aged 15 to 49 years old, from the cities of Campinas and Sumaré, in São Paulo. The respondents were asked whether they had ever been coerced, threatened or physically forced to have sexual intercourse in their lifetime. The results showed prevalence rates of 23% among women who had suffered some kind of coercion and 7.1% among those who had been physically forced.

Similarly, Moraes *et al.* (2006) intended to measure the prevalence of lifetime sexual coercion, committed by any perpetrator, among 4,634 young individuals between 18 and 24 years old in the cities of Porto Alegre, Rio de Janeiro and Salvador. The question used was “*Has anybody tried to force you to have sexual relations against your will?*” and the results presented prevalence rates of 16.5% for women and 11.1% for men. Another study that sought to estimate the prevalence of lifetime sexual violence committed by any perpetrator was conducted by Oliveira *et al.* (2013). The authors used a sample of 1,216 women over 18 years old from the

city of São Paulo and the results indicated a prevalence of 7.5% of sexual violence.

Among the studies analyzed by Winzer, which focused on sexual IPV, it is worth mentioning the works of Schraiber *et al.* (2008), Moura *et al.* (2009) and Rafael and Moura (2014). Schraiber *et al.* (2008) used data from questionnaires adapted from the WHO Multicentre Study conducted with 5,040 individuals aged 16 to 65 years in urban areas of Brazil. The results showed prevalence rates of sexual IPV of 11.8% for women and 5.1% for men.

In addition, Moura *et al.* (2009) conducted an analysis with 278 women aged 15 to 49 years old in the city of Brasília. The questionnaire used was also an adaptation of the WHO Multicentre Study and the authors obtained a prevalence of 15.5% of lifetime sexual IPV. With a sample of 640 women between 20 and 64 years old from the city of Nova Iguaçu, Rio de Janeiro, Rafael and Moura (2014) used a Portuguese language version of the Revised CTS to evaluate cases of lifetime sexual IPV. The results indicate a rate of 39.1%. For a more in-depth analysis of other studies, see Winzer (2016).

Moreover, it is worth mentioning the results obtained by Carvalho *et al.* (2018) in the first two waves of the PSCVDF-MULHER conducted between 2016 and 2017 with 10,518 women, aged 15-49 years, from the nine capitals of the Brazilian Northeast. Using CTS-type questions and based on the WHO Multicentre Survey, the authors found prevalence rates of 7.75% and 7.28% of lifetime sexual violence perpetrated by intimate partner or ex-partner, in 2016 and 2017, respectively. The last 12 months' rates were 2.62% in 2016 and 2.37% in 2017. All these observations are presented below in Table 1 which describes some characteristics of these studies that used self-report questionnaires to measure sexual violence.

Therefore it is possible to observe how administrative data are underestimated and tend not to reflect well the reality of sexual violence, and, thus, surveys with self-reports tend to be more accurate. However, these studies cannot be used for direct comparisons, and the reason for this is the failures in Brazilian research on sexual violence pointed out by Winzer (2016). Two of the main failures are the lack of representation of the Brazilian population and of uniformity in the definition of sexual violence. Most of the studies reviewed used convenience samples, such as students and people from the health service or vulnerable regions, and most of them are concentrated in the Southeast region. In addition, some studies used generic terms, which could cause ambiguity, while others considered different violent acts and specified them in the questions, improving the accuracy of the data.

Winzer (2016), therefore, presents some suggestions to improve research on sexual

Table 1 – Characteristics of the studies using self-report questionnaires

Authors	Sample	Duration of sexual violence	Perpetrator	Prevalence rate
Faúndes <i>et al.</i> (2000)	1,838 women from Campinas and Sumaré, SP	Lifetime	Any	23% by coercion and 7.1% by physical force
Moraes <i>et al.</i> (2006)	4,634 individuals from Porto Alegre, Rio de Janeiro and Salvador	Lifetime	Any	16.5% for women; 11.1% for men
Schraiber <i>et al.</i> (2007)	2,128 women from São Paulo and Pernambuco	Lifetime	Any	São Paulo: 10.1%, Pernambuco: 14.3%
Schraiber <i>et al.</i> (2008)	5,040 individuals from Brazilian urban areas	Lifetime	Intimate partner or ex-partner	11.8% for women; 5.1% for men
Moura <i>et al.</i> (2009)	278 women from Brasília	Lifetime	Intimate partner or ex-partner	15.5%
Oliveira <i>et al.</i> (2013)	1,216 women from São Paulo	Lifetime	Any	7.5%
Rafael and Moura (2014)	640 women from Nova Iguaçu	Lifetime	Intimate partner or ex-partner	39.1%
Carvalho <i>et al.</i> (2018)	10,518 women from Brazilian Northeast capitals	Lifetime and Last 12 months	Intimate partner or ex-partner	Lifetime: 7.75% (2016) and 7.28% (2017). Last 12 months: 2.62% (2016) and 2.37% (2017)
IBGE (2020)	108,525 households from Brazil	Lifetime	Any	8.9%

Source: elaborated by the author.

violence. First, studies must be more representative, with a sample from different regions of Brazil. Second, the legal definition of rape and the definitions of violence presented by bodies, such as the WHO, need to be used to homogenize the description of different violent acts, enabling comparisons between surveys. Also, different social groups by race, sexual orientation and education should be incorporated into the analysis and sexual violence must be examined from a longitudinal perspective in order to assess its persistence over the years.

As described previously, thus, data from official sources are problematic and underestimated, which in turn encourages surveys that enable self-reporting. Moreover, these surveys need to be designed in a way to avoid additional imprecisions deriving from fear and discomfort among participants (BLAIR, 2015). Besides the suggestions described previously by Bennice

and Resick (2003) and Ellsberg *et al.* (2001) on the design of surveys on violence, indirect questioning methods can be used to improve response elicitation.



### 3 THE LIST EXPERIMENT METHOD

List Experiment (also known as item count or unmatched count technique) emerged in the doctoral dissertation of Judith Miller (1984), whose objective was to analyze the prevalence of heroin consumption in the American population. Furthermore, it would be a new survey technique aimed at measuring socially deviant behaviors and other sensitive questions.

Other previous and already used techniques served as inspiration such as the Aggregated Response and Nominative Technique, besides the classic Randomized Response. The idea was to utilize the advantages of each of these methods to obtain the full participation of the respondents and to guarantee them anonymity and privacy. Also, the intention is to be a method that is easy to apply and minimally confusing for both the interviewee and the interviewer. The next subsections present the method specifications, its statistical approach, its use in the literature about violence and its application in the PCSVDF-Mulher survey.

#### 3.1 Experiment specificities

The list experiment basically consists of presenting a list of items to a respondent, who must say how many items are true for him/her. It is not necessary to inform which are true. The sample of participants thus is divided into two groups: the control group, which receives a list of  $J$  neutral statements, and the treatment group, which receives the same list, however, added by the sensitive item ( $J + 1$  items).

This way, the estimated prevalence of the sensitive item can be obtained by the difference between the average responses of the two groups — as a difference in means estimator (MILLER, 1984). In addition, the method seeks to ensure privacy and anonymity to the participants, since the aggregate of responses is obtained and there is no knowledge of the individual responses by the interviewer. Also, its application is simple and not confusing, since respondents would only need to answer the number of true items.

Blair and Imai (2012) point out two necessary assumptions for the success of the list experiment: *no design effects* and *no liars*. The first states that the insertion of the sensitive item in the list must not change the responses of the neutral items and the latter, that the responses to the sensitive item must be true. Therefore, under these assumptions, is possible to obtain the sensitive item prevalence by a difference in means estimator, as demonstrated by Miller (1984) <sup>1</sup>:

<sup>1</sup> Appendix A presents a development of this estimator according to Blair and Imai (2012) notation.

$$\hat{\tau} = \frac{1}{N_1} \sum_{i=1}^N T_i Y_i - \frac{1}{N_0} \sum_{i=1}^N (1 - T_i) Y_i, \quad (3.1)$$

where  $T_i$  is a binary variable that indicates the respondent's group ( $T_i = 1$  for the treatment group),  $Y_i$  is the participant's response, and  $N_1$  and  $N_0$  are the size of treatment and control groups, respectively, ( $N = N_0 + N_1$ ). It is also possible to note that the difference in means estimator can be seen as a linear regression of the participant's response ( $Y_i$ ) in relation to the treatment status ( $T_i$ ).

Under these two assumptions, as yet presented by Blair and Imai (2012) and Glynn (2013), is possible to identify the joint distribution of  $(Y_i(0), Z^*_{i,J+1})$  — where  $Y_i(0)$  is the participant  $i$ 's response to the neutral items and  $Z^*_{i,J+1}$  is the truthful answer to the sensitive item — characterizing all possible types of respondents. Thus, according to the authors, the population proportion of each respondent's type can be identified from the sample and is denoted as  $\pi_{yz} = P(Y_i(0) = y, Z^*_{i,J+1} = z)$ , where,  $y = 0, \dots, J$  and  $z = 0, 1$ . Therefore:

$$\pi_{y1} = P(Y_i \leq y | T_i = 0) - P(Y_i \leq y | T_i = 1) \quad (3.2)$$

and

$$\pi_{y0} = P(Y_i \leq y | T_i = 1) - P(Y_i \leq y - 1 | T_i = 0). \quad (3.3)$$

However, some observations must be made. Because the sensitive item is aggregated with the neutral items, the list experiment estimator tends to present high variance, in relation to the direct questioning (GLYNN, 2013; MILLER, 1984). This leads to a trade-off between ensuring participant privacy and the estimator's efficiency.

In addition, the no liars assumption can be affected by the presence of ceiling and floor effects. Ceiling effect occurs when all items, including the sensitive item, are true for the respondent. Alternatively, when only the sensitive item is true and the neutral items are false, there is a floor effect (BLAIR; IMAI, 2012). Thus, under these two scenarios, the respondent of the treatment group could not feel safe to answer truly because anonymity is no longer ensured, being willing to lie and jeopardizing the experiment. Also, Glynn (2013) adverts about near-ceiling effects, where the respondent could underreport yet more items.

To ensure the assumptions and to deal with these potential problems, some strategies are indicated. Besides using a large sample (GLYNN, 2013), primarily, the size of the list must

be balanced. Long lists can confuse and/or fatigue the respondents and too short lists can reduce the sense of privacy and anonymity (HINSLEY *et al.*, 2019; LI; NOORTGATE, 2019; MILLER, 1984). Commonly, authors use lists with three or four neutral items. In addition, the choice of the sensitive item must be made in relation to the context of the survey object and avoid neutral items that may be sensitive or prone to bias (HINSLEY *et al.*, 2019).

Glynn (2013) also points out that the use of many low-variance neutral items, i.e. items that have a high or low prevalence, should be avoided. Moreover, the insertion of negatively correlated items is recommended because it helps to reduce both variance and floor and ceiling effects (GLYNN, 2013; MILLER, 1984). Another approach presented by Miller (1984) to reduce the variance, and frequently implemented, is the double list experiment, where two lists are used and the control group of one is used as the treatment group of the other and vice versa.

Furthermore, pilot tests are highly encouraged by several authors, both to observe the performance of the experiment between participants and interviewers and to verify whether the choice of items is efficient and to detect the validity of the assumptions. Also, these pre-tests are essential to correct the non-strategic measurement errors (AHLQUIST, 2018; BLAIR *et al.*, 2019). These types of errors occur for reasons such as coding errors and survey conduction or poor quality answers due to lack of understanding by participants and have received attention in more recent works (RIAMBAU; OSTWALD, 2021). Moreover, Riambau and Ostwald (2021) proposed the use of a placebo item to verify the presence of non-strategic measurement errors.

Finally, is necessary to emphasize that the list experiment, as an indirect questioning method, is not suitable for all contexts or scenarios. Ahlquist (2018) and Blair *et al.* (2019) demonstrate that for rare events and behaviors or with very low prevalence, the experiment is not appropriate, because a large sample of respondents is required. Moreover, in a meta-analysis conducted by Li and Noortgate (2019) with 54 studies that applied list experiments, the authors observed that the method performs better in culturally more collectivist societies, where the impressions and opinions of others are important, unlike culturally more individualized societies. A very similar result to that observed by Blair *et al.* (2020) that there is no reason to use a list experiment if the sensitive item does not suffer from sensitivity bias, that is, it is not in fact socially sensitive.

### ***3.1.1 Improvements and other designs for list experiment***

In addition to the focus of this study, it is worth noting some contributions and improvements to the list experiment methodology made by different authors, most precisely in recent years. As mentioned earlier, the double list experiment, described by Miller (1984), aims to reduce the variance of the difference in means estimator. Also, Corstange (2009) presents a modification in the standard approach of the method in which participants of the control group are asked directly about each of the neutral items on the list, improving the achievement of the prevalence of the sensitive item and Glynn (2013) suggests design principles for reducing the high variance problem in standard and double lists. Imai (2011) and Blair and Imai (2012) bring important improvements in the statistical and multivariate analysis of list experiments in addition to the traditional differences in means estimator, which will be used here.

A revised version is presented by Chaudhuri and Christofides (2013), in which the authors consider two groups, one whose respondents have sensitive and neutral behaviors and the other in which respondents have neither behavior. Also, they use a design in which certain items in the experiment have two sub-items, in order to reduce nonsampling error. In addition, the authors present a design with three samples, with the third sample being an addition to the two groups mentioned earlier, and a design in which each item in the experiment is answered by a number rather than whether the item is true.

Another important point in the list experiment approach is the measurement of sensitivity bias or misreporting, earlier erroneously referred to as social desirability bias (BLAIR *et al.*, 2020). It consists in comparing the prevalence of the sensitive item obtained by the list experiment with the prevalence obtained by direct questioning. If the former is higher than the latter, then there is an indication of the presence of sensitivity bias. Blair and Imai (2012) describe this approach and also point out two suggestions: the direct questioning of the sensitive item be done after the experiment and only for the control group, since the treatment group may suffer a "training bias".

Direct questioning is also employed by Aronow *et al.* (2015) who developed an estimator that combines list experiment and direct report as an alternative more efficient to the traditional differences in means estimator and utilized placebo tests to improve this design.

### 3.2 Statistical approach

Although commonly used, the difference in means estimator has some limitations. As pointed out by Blair and Imai (2012) and Imai (2011), this estimator does not allow to evaluate the correlation between the participants' response to the sensitive item and their characteristics. Even if the difference in means is obtained by subgroups of the sample, the result may not be efficient, in addition to requiring a very large sample. Therefore, Imai (2011) developed two new regression estimators: the nonlinear least squares (NLS) and the maximum likelihood (ML), both of which follow the assumptions of no design effects and no liars.

The former appears as a generalization of the Equation (3.1), thus:

$$Y_i = f(X_i, \gamma) + T_i g(X_i, \delta) + \varepsilon_i, \quad (3.4)$$

where  $X_i$  is a vector of respondents' characteristics,  $(\gamma, \delta)$  is a vector of unknown parameters and  $E(\varepsilon_i | X_i, T_i) = 0$ .

According to Imai (2011),  $f(x, \gamma) = E(Y_i(0) | X_i = x)$  and  $g(x, \delta) = P(Z_{i,J+1}^* = 1 | X_i = x)$  for  $x \in \mathbf{X}$ , that is, the conditional expectation of the control items and conditional probability of the sensitive item given the covariates  $x$ . Also, the estimation of  $(\gamma, \delta)$  parameters is done in two steps. First,  $\gamma$  is obtained considering the control group ( $T_i = 0$ ), and then, this  $\gamma$  is used to obtain  $\delta$ , in the second step, from the treatment group. The asymptotic distribution of this NLS estimator obtained may be derived for a logistic case such as  $f(x, \gamma) = J \text{logit}^{-1}(x^\top \gamma)$  and  $g(x, \delta) = \text{logit}^{-1}(x^\top \delta)$ .

Some observations in relation NLS estimator are made by Imai (2011) and Blair and Imai (2012). First, the difference in means estimator can be seen as a special case of NLS when  $f(x, \gamma) = \gamma$  and  $g(x, \delta) = \delta$ , and when  $f(x, \gamma) = x^\top \gamma$  and  $g(x, \delta) = x^\top \delta$ , this can be the case of a linear model with interaction terms. Second, despite the NLS estimator being a simple and robust method that yields a consistent estimator, it has a potential loss of statistical efficiency, because not all information about the  $(Y_i(0), Z_{i,J+1}^*)$  distribution is used.

To get around this problem, Imai (2011) developed the maximum likelihood estimator (ML) using all information of the previous joint distribution. Thus, is assumed that  $g(x, \delta) = P(Z_{i,J+1}^* = 1 | X_i = x)$  and  $h_z(y; x, \psi_z) = P(Y_i(0) = y | Z_{i,J+1}^* = z, X_i = x)$ , where  $y = 0, \dots, J$  and  $z = 0, 1$ . In this case, only  $g(x, \delta)$  is considered because, as mentioned by Imai (2011), the main concern frequently is to evaluate the responses to the sensitive item.

The likelihood function described by Imai (2011) is given by:

$$\begin{aligned}
L(\psi_0, \psi_1, \delta; \{Y_i, T_i, X_i\}_{i=1}^N) &= \prod_{i \in \mathcal{T}(1,0)} [1 - g(X_i, \delta)] h_0(0; X_i, \psi_0) \times \prod_{i \in \mathcal{T}(1,J+1)} g(X_i, \delta) h_1(J; X_i, \psi_1) \\
&\times \prod_{y=1}^J \prod_{i \in \mathcal{T}(1,y)} \{g(X_i, \delta) h_1(y-1; X_i, \psi_1) + [1 - g(X_i, \delta)] h_0(y; X_i, \psi_0)\} \\
&\times \prod_{y=0}^J \prod_{i \in \mathcal{T}(0,y)} \{g(X_i, \delta) h_1(y; X_i, \psi_1) + [1 - g(X_i, \delta)] h_0(y; X_i, \psi_0)\},
\end{aligned} \tag{3.5}$$

where  $\mathcal{T}(t, y)$  is the set of respondents with  $(T_i, Y_i) = (t, y)$ .

Given the complexity of the Equation (3.5), Imai (2011) proposed an expectation-maximization (EM) algorithm in which  $Z_{i,J+1}^*$  is considered as a partially missing data. The explanation of this algorithm is beyond the scope of this study, but it is worth mentioning its stability, due to the monotone convergence property and its ease in relation to an optimization problem, since only a separate estimation of  $g(x, \delta)$  and  $h_z(y; x, \psi_z)$  is required (BLAIR; IMAI, 2012).

### 3.2.1 Design effects detection

Another important contribution given by Blair and Imai (2012), in the list experiment analysis, is the statistical test to detect design effects, a violation of the assumption that participants' responses to control items are not affected by the inclusion of the sensitive item.

The test is based on the proportions of respondent types  $\pi_{yz}$ , defined by Equations (3.2) and (3.3). The null hypothesis is formally defined by the author as:

$$H_0 : \begin{cases} P(Y_i \leq y | T_i = 0) \geq P(Y_i \leq y | T_i = 1) \text{ for all } y = 0, \dots, J-1 \text{ and} \\ P(Y_i \leq y | T_i = 1) \geq P(Y_i \leq y-1 | T_i = 0) \text{ for all } y = 1, \dots, J. \end{cases} \tag{3.6}$$

In other words, any proportion of respondents,  $\pi_{yz}$  cannot be negative. The alternative hypothesis is that at least one of them is negative or, more precisely, at least one value of  $y$  does not satisfy  $H_0$  in (3.6).

Also according to Blair and Imai (2012), the basic idea of the test is to reduce it to a test of two first-order stochastic dominance relationships, since under the assumption of no design effect, it is expected that including the sensitive item, the response of treatment group is larger than that of the control group by at most one item. Hence, two separate hypothesis tests are carried out for each stochastic dominance relationship and the Bonferroni correction is

used. The null hypothesis is rejected if the smallest of the two generated  $p$ -values is less than  $\alpha/2$ , where  $\alpha$  is the chosen significance level. This test also verifies, if any value of  $\pi_{yz}$  becomes negative, if this is due to chance or if there really are design effects.

Some limitations of the test are observed by Blair and Imai (2012): a particular lack of statistical power, such as a no liars assumption violation, can invalidate the test result. Moreover, if some positive design effects are canceled out by other negative effects, the test can be jeopardized.

### 3.3 List experiment in the context of domestic violence measurement

From the beginning, the list experiment was implemented as a measurement method in several sensitive issues as presented in Section 1. Regarding violence against women, the application of the experiment is more recent and small, indeed, there are no studies on violence using list experiment prior to 2010 decade. In addition, most existing studies are restricted to intimate partner violence (IPV), mainly physical violence.

In this subsection, studies that implemented the list experiment in surveys on violence, in different forms and social contexts, will be presented. It is noteworthy that no other work was found that dealt exclusively with sexual violence against women committed by perpetrators who were not intimate partner. Very few dealt with sexual violence, but perpetrated by the partner, and others with sexual violence in the context of war, in which male victims and different perpetrators, including the intimate partner, were also considered, as will be presented below.

Krebs *et al.* (2011) analyzed the precision of indirect questioning methods against direct questioning to obtain estimates about sexual assault among female undergraduate students. The sample was comprised of 5,446 students from two USA large public universities and the survey was conducted using a web questionnaire. Initially, women were directly asked about sexual assault experiences caused by any person, stranger or acquaintance, next, the list experiment was carried out. Among the neutral items on the list, the authors chose to insert items that could be considered sensitive, so that the inclusion of the sensitive item would not draw so much attention among the respondents. In a design of a double list, the authors obtained prevalence rates of sexual assault of 5.76% and 4.84% among the two lists, giving a prevalence of 5.30%. The direct question presented a prevalence of 4.74%. However, the comparison between the experiment and the direct question was not statistically significant.

Joseph *et al.* (2017) sought to measure the incidence and underreporting of domestic

violence and physical harassment on public/private buses in Kerala, India. The experiment was carried out with a sample of 14,575 households. However, the interview was not conducted exclusively with women. Other family members, including men, were interviewed to talk about the violence suffered by a woman in the household. Among the results, it was observed that 15% of the households reported that they had a woman who had suffered physical domestic violence perpetrated by her partner, at least once in her life, and that 1% had a woman who had suffered physical harassment on a public or private bus, during the last year. Through direct questioning, rates of 5.6% were obtained for physical violence and 2.6% for physical harassment. Thus, an underreporting of 9.39 percentage points was found for the former and an overreporting of 1.79 points for the latter. In addition, it was observed that urban and poor women were more prone to underreporting IPV. There was also a greater tendency to underreport among employed, younger ( $\leq 30$ ), older ( $\geq 50$ ), more educated, and Hindu participants.

Similarly, Peterman *et al.* (2018) used the list experiment to measure cases of physical violence perpetrated by intimate partners, in an experimental impact assessment of the Government of Zambia's Child Grant Program (CGP). The experiment was carried out with 2,171 women aged between 15 and 49 years, from a beneficiary and non-beneficiary households, after 48 months after an initial survey about the program. The results obtained showed that approximately 14.6% of women experienced physical violence committed by an intimate partner in the last 12 months previous to the experiment. This indicates, according to the authors, that the program had no measurable effect on domestic violence. Also, no interactions between the violence and demographic indicators used by the authors were reported. There was also no measurement of misreporting because there was no direct questioning of the physical violence suffered.

In another study carried out on the African continent, Lépine *et al.* (2020) applied a double list experiment in relation to two sensitive behaviors: the use of condom among female sex workers in Senegal and physical IPV among rural women in Burkina Faso. However, only the results of the survey about violence will be presented here. They used a sample of 1,706 women who met the survey criteria and considered IPV experiences in the last 6 months before the survey. By direct questioning, a 5.4% prevalence of violence was obtained and by the list experiment, an average prevalence of 23.8% was observed, generating a misreporting of 18.4 percentage points. Nonetheless, among subgroups of women, the results were not statistically significant.



Cullen (2020) analyzed the magnitude and predictors of misreporting of IPV and sexual violence committed by different perpetrators in Nigeria and Rwanda. In Rwanda, the experiment was conducted with a sample of 2,728 heterosexual couples who were participating in the baseline survey of a domestic violence prevention study. The sample was divided equally into three groups according to the form of questioning: direct, through face-to-face interviews and self-administered interviews with computer audio (ACASI), and indirect through the list experiment. Rwandan women are asked about physical IPV in the last 12 months prior to the survey and cases of sexual violence committed by someone other than the current partner, during their lives. Also, men are asked about two cases of emotional IPV. In Nigeria, the final sample consisted of 2,817 women who were also randomly submitted to the survey methods, except for the ACASI. The sample was asked about three forms of IPV: emotional, physical and sexual, in the last 12 months prior to the survey. In general, for both countries, the list experiment presented more reports of violence, followed by the ACASI method and the direct face-to-face interview.

Using the difference in means approach, Cullen (2020) observed, in the case of Rwanda, a prevalence of 20.6% of IPV and 8.8% of sexual violence perpetrated by someone other than the current partner, by list experiment. Compared with direct questioning, only IPV presented a statically significant misreporting of almost 10 percentage points. And in the case of Nigeria, was observed prevalences of 39.7%, 26.6% and 26% of emotional, physical and sexual IPV. The misreporting degree observed was significant only for emotional (9.8 points) and physical (7.4 points) IPV. Moreover, the analysis among subgroups carried out only with IPV, showed that women who are more vulnerable, unemployed, more educated and that live in conservative communities are more prone to misreport the suffered violence.

Also, Gilligan *et al.* (2021) used a list experiment to measure the prevalence of IPV in three forms, emotional, physical and sexual, in rural Ethiopia. The sample was composed of 2,083 women divided into 4 groups, in which one form of violence was questioned for each group and the fourth group received the control list. Moreover, each group received three lists, and the severity of each violent act varied. In addition, relatively sensitive items were included in the lists to camouflage the intention to measure IPV. The prevalence of IPV measured directly ranged between 3% and 8%. However, the list experiment presented prevalence rates close to zero or in the same range as that obtained directly.

Agüero and Frisancho (2022) evaluated the prevalence of lifetime physical and sexual IPV in a survey with 992 women participating in a village banking program in Lima,

Peru. Seven violent acts were considered, and for each act of violence, a list experiment was applied. Also, only the control group was directly questioned about the IPV. When comparing the response rates to indirect and direct questions, and evaluating misreporting, the authors did not identify any statistically significant difference between the seven types of violence considered. However, in the analysis by subgroups, there was a greater tendency of significant misreporting among women with tertiary education.

With respect to wartime sexual violence, two studies are presented below. First, Traummüller *et al.* (2019) used the list experiment in a survey of cases of sexual violence in Sri Lanka, in the context of the civil war between the Sinhalese and Tamil peoples, with a sample of 1,800 respondents. It is worth mentioning that in the experiment there was no differentiation between the perpetrators, such as intimate partners, combatants or officers of the security forces, and male and female victims were considered. The results of ordinary least squares (OLS) and ML estimates pointed out that about 13% of the Sri Lankan population suffered sexual violence during the war, a prevalence ten times higher than that obtained by direct questioning. About 53% of all Tamils were victims of sexual violence during the civil war, and the inhabitants of the Eastern province were three times more likely to have suffered sexual violence, compared to other provinces in the country. Moreover, 29% of displaced male respondents reported cases of sexual violence, during the experiment, which, according to the authors, indicates that sexual violence was used as torture by the country's security forces.

Similarly, Koos and Traummüller (2022) aim to demonstrate the potential of list experiments for overcoming underreporting bias and estimating the prevalence of wartime sexual violence. The sample of the experiment was from three countries: the Democratic Republic of Congo (DRC), Liberia and Sri Lanka. Also, the authors estimated the effect of sexual violence on outcomes of social and political development: civic participation, interethnic relations and political trust. In DRC, sexual violence was defined as rape perpetrated by armed groups against respondents or their household members. In Liberia and Sri Lanka, only respondents were considered victims and the perpetrator could be anyone. To measure the effect of violence on social outcomes, a model using expectation-maximization, as presented by Imai (2011), was estimated. The results of the list experiment presented prevalence rates of 12% to DRC, 14% to Liberia and 13% to Sri Lanka populations. The direct question presented rates of 6% to DRC, 5% to Liberia and 1% in Sri Lanka. The sensitivity bias was found in Liberia and Sri Lanka cases but not in DRC. In relation to effects on social and political outcomes, the authors observed

positive effects on civic participation, but no effect was observed on interethnic relations and political trust.

Recently, Porter *et al.* (2021) analyzed the increase in physical domestic violence during the Covid-19 pandemic using the list experiment. The sample was composed of 1,841 people of both sexes aged 18-26 from Peru, interviewed by phone. In addition, it was considered as a perpetrator anyone who live with the respondent. The authors used a double list experiment and a two steps linear model was estimated to measure the percentage of respondents whose violence increased and controlling by some factors such as age, gender and history of violence. The result indicated that 8.3% of respondents answered an increase in physical violence during the Covid-19 lockdown. However, in the model, only past violence experiences presented statistical significance, nearly 18% of the cases.

Some observations, furthermore, must be made. Most of the studies mentioned here used the standard difference in means estimator, only Traummüller *et al.* (2019) and Koos and Traummüller (2022) used an additional estimator. In relation to the design of the experiment, Krebs *et al.* (2011), Lépine *et al.* (2020), Porter *et al.* (2021) applied a double list design and Gilligan *et al.* (2021) used an extension with three treatment lists and one control list and Agüero and Frisancho (2022) worked with seven lists for the sample. Only Cullen (2020) used the design developed by Corstange (2009) which control items are also asked directly. Peterman *et al.* (2018) did not measure the misreporting because the sensitive item was not directly asked of respondents. In addition, all studies except Krebs *et al.* (2011), Joseph *et al.* (2017) and Peterman *et al.* (2018), tested the assumption of no design and ceiling/floor effects.

Also, the recommendations of Glynn (2013) Blair and Imai (2012) about the negative correlation among the neutral items, to create the list of neutral statements, were applied by Lépine *et al.* (2020), Gilligan *et al.* (2021), Agüero and Frisancho (2022) and Porter *et al.* (2021). In its turn, Koos and Traummüller (2022) adapted the sensitive item on the list according to the countries' local contexts in the survey. All these descriptions are presented in Table 2.

Furthermore, according to that table, it is possible to observe that as time has passed, some experiments have tended to present more refined designs and estimators, in addition to evaluating the existence of the hypotheses inherent in the experiment, according to Blair and Imai (2012). Moreover, all studies except Krebs *et al.* (2011) concentrated their analysis on developing countries.

Table 2 – Characteristics of the studies using List Experiment

Authors	Sample	Type of violence	Estimator and design used	Observations
Krebs <i>et al.</i> (2011)	Female undergraduate students in the USA.	Sexual assault by anyone since early college.	Double list experiment with the difference in means estimator.	The authors did not test for design effects and did not evaluate ceiling and floor effects.
Joseph <i>et al.</i> (2017)	Households in Kerala.	Lifetime physical IPV and physical harassment by other perpetrators in the last 12 months.	Standard design with the difference in means estimator.	The authors did not test for design effects and did not evaluate ceiling and floor effects. The interview was not exclusively conducted with women.
Peterman <i>et al.</i> (2018)	Women from Zambia.	Physical IPV in the last 12 months.	Standard design with the difference in means estimator.	The authors did not measure misreporting, did not test for design effects and did not evaluate ceiling and floor effects.
Lépine <i>et al.</i> (2020)	Women from rural Burkina Faso.	Physical IPV in the last 6 months.	Double list experiment with the difference in means estimator.	The choice of neutral items was made according to the Glynn (2013) and Blair and Imai (2012) recommendations.
Cullen (2020)	Women and men from Rwanda and women from Nigeria.	Rwanda: physical IPV in the last 12 months and lifetime sexual violence by someone who is not the current partner. Nigeria: emotional, physical and sexual IPV in the last 12 months.	Difference in means estimator. Nigeria: standard design and Rwanda: Corstange (2009) design.	The author followed the Blair <i>et al.</i> (2020) considerations about high variance in the experiment.
Gilligan <i>et al.</i> (2021)	Women from rural Ethiopia.	Emotional, physical and sexual IPV in the last 12 months.	Difference in means estimator in an extension of double list experiment.	The choice of neutral items was made according to the Blair and Imai (2012) recommendations.
Agüero and Frisancho (2022)	Women from Peru.	Lifetime physical and sexual IPV.	Standard design with the difference in means estimator.	The choice of neutral items was made according to the recommendations of Glynn (2013).
Traunmüller <i>et al.</i> (2019)	Women and men from Sri Lanka.	Wartime sexual violence perpetrated by anyone.	Difference in means estimator and ML regression according to Imai (2011).	The authors also estimated the regression considering the ceiling and floor effects as shown by Blair and Imai (2012).
Koos and Traunmüller (2022)	Women and men from DRC, Liberia and Sri Lanka.	Wartime sexual violence.	Difference in means estimator and estimation via Expectation-Maximization algorithm by Imai (2011) and Blair and Imai (2012).	The sensitive item in the experiment was adapted to the local contexts of the countries.
Porter <i>et al.</i> (2021)	Women and men from Peru.	Physical violence perpetrated by someone in the same house.	Double list experiment with the difference in means estimator.	The choice of neutral items was made according to the recommendations of Glynn (2013).

Source: elaborated by the author.

### 3.4 The PCSVDF-Mulher list experiment

In the PCSVDF-Mulher survey, women are asked about issues such as household characteristics, socioeconomic conditions, labor market, general and reproductive health, partner relationship, knowledge about Brazilian domestic violence legislation, access and use of the servicing network for victims and domestic and non-partner violence experiences (CARVALHO *et al.*, 2018).

The experiment is carried out in the section on cases of non-partner physical and sexual violence, posterior to the section on intimate partner violence, which includes different cases of violence in its different definitions<sup>2</sup>. First, women were asked about physical aggression: whether they suffered any case, if so, who the perpetrator was, the frequency and if the aggression happened in the last 12 months, according to the perpetrator reported.

Then, thereafter, there is the list experiment on sexual violence committed by perpetrators other than partner or ex, where the interviewer makes the following introduction: “*Here is a list of 4 (or 5) situations that some people have been involved in and others have not throughout their lives. Please tell me **HOW MANY YOU HAVE BEEN INVOLVED. JUST SAY HOW MANY YOU HAVE BEEN INVOLVED IN**, your answer will be just a number: 0, 1, 2, 3, or 4 (or 5). Wait until I show you the entire list before you answer. May I show you?*”

Next, the interviewer pass the tablet to the respondent to read the following list, if she is in the control group:

- (a) *Lost your cell phone;*
- (b) *Read a major newspaper in your state;*
- (c) *Watched an entire chapter of a soap opera;*
- (d) *Visited a museum in your city.*

And for the treatment group, the sensitive item is added:

- (e) *Someone forced you to have sexual relation or perform a sexual act when you did not want to.*

Thus, the interviewer waits a few seconds and asks the woman to answer the number of items. Besides, it is worth mentioning, the order of items in the list is random among the participants. Thereafter, the sensitive item is directly asked all women, more precisely, the interviewer asks: “*Has anyone ever forced you to have sex or perform a sexual act when you did*

<sup>2</sup> The PCSVDF-MULHER study replicates the same section applied by Garcia-Moreno *et al.* (2005) which uses a CTS approach to measure domestic violence.

*not want to?*”. If the answer is positive, it is also asked who the perpetrator was and how many times the violence happened.

As presented by Table 3, the PCSVDF-Mulher considers three sets of perpetrators. First, women are asked, by CTS-type questions, about sexual violence perpetrated by an intimate partner or ex-partner. Then, in the list experiment and in the direct question, just other perpetrators than partner or ex-partner are considered.

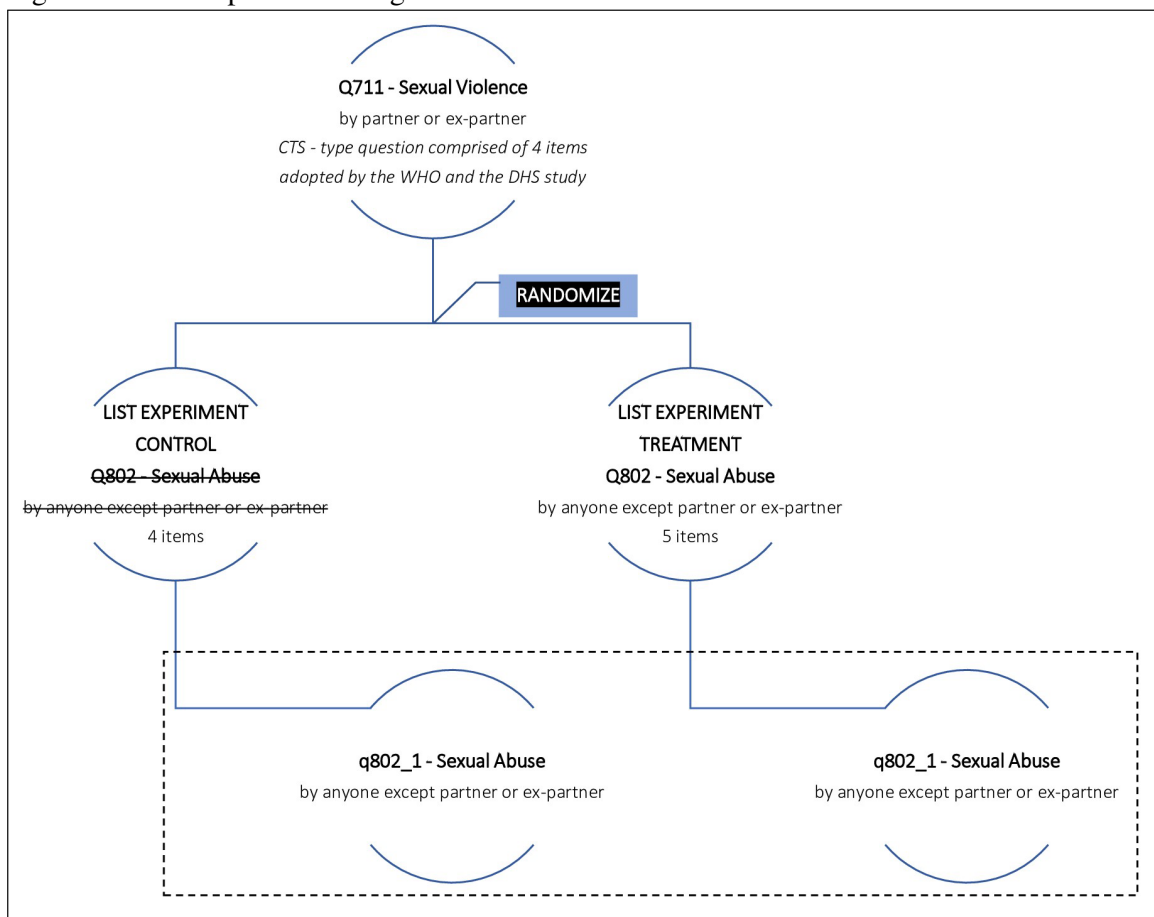
Table 3 – Question on sexual violence and set of perpetrators

Question	Set of perpetrators
<p><b>Q711</b> “Force you to have sexual intercourse when you did not want to?”  “Had a sexual relationship with you, without using physical violence, just because you were afraid of his reaction if you said no?”  “Force you to do something sexual that you found degrading or humiliating?”  “During a consensual sex act, removed the condom without your consent?”</p>	Intimate partner or ex-partner
<p><b>Q802</b> “Someone forced you to have sexual relation or perform a sexual act when you did not want to.”</p>	Other except partner or ex-partner
<p><b>Q802_1</b> “Has anyone ever forced you to have sex or perform a sexual act when you did not want to?”</p>	Other except partner or ex-partner

Source: PCSVDF-Mulher and elaborated by the author.

Also, as presented by Figure 1, first, women are asked about experiences of IPV, including sexual violence, which is covered in question *Q711*. Afterward, each woman is randomized into the treatment and control groups and receives the list of 4 (5) items if she is in the control (treatment) group. In the survey, the experiment is coded by question *Q802* and, at the end of the experiment, the sensitive item is asked of all of them directly, by *Q802\_1* question. Appendix B describes how sexual violence victimization is measured, given the sets of possible perpetrators.

Figure 1 – List experiment design in the PCSVDF-Mulher



Source: PCSVDF-Mulher

#### 4 EXPLORATORY DATA ANALYSIS

As previously presented, the list experiment was conducted during the 3<sup>rd</sup> wave of the PCSVDF-Mulher in 2019 and the sample for the experiment consisted of 4,746 women aged 14-59 years. Interviews were conducted in seven Brazilian capitals: Fortaleza, Recife, Goiânia, Porto Alegre, São Paulo and Belém. Table 4, below, presents the frequency of some respondents' characteristics by city. Thirty women are missing from the Table because their cities were not located.

Table 4 – Sample characteristics (percentage frequencies)

	<b>Fortaleza</b> (n = 783)	<b>Recife</b> (n = 590)	<b>Salvador</b> (n = 912)	<b>Goiânia</b> (n = 468)	<b>Porto Alegre</b> (n = 628)	<b>São Paulo</b> (n = 751)	<b>Belém</b> (n = 584)
<b>Race</b>							
<i>White</i>	19.80	23.05	6.03	26.92	57.17	48.20	16.95
<i>Black</i>	14.18	24.58	49.56	17.09	28.02	17.58	19.86
<i>Pardo</i>	63.86	50.17	43.97	53.63	14.01	32.36	61.30
<i>Asian or Indigenous</i>	1.28	1.52	0.44	1.07	0.32	1.20	1.03
<b>Education level</b>							
<i>No education</i>	19.54	19.49	12.83	18.16	25.32	7.99	15.75
<i>Fundamental</i>	23.37	22.88	20.83	24.15	29.78	21.70	22.43
<i>High School</i>	47.38	48.47	56.47	44.02	37.26	55.53	52.40
<i>Tertiary</i>	9.58	9.15	9.87	13.68	7.48	14.65	9.25
<b>Age</b>							
<i>14-19</i>	10.22	8.81	7.46	15.81	11.31	8.92	9.25
<i>20-24</i>	10.60	11.86	12.50	12.82	10.19	11.72	11.47
<i>25-29</i>	12.64	12.37	13.16	11.75	12.90	10.12	10.79
<i>30-34</i>	13.54	12.71	11.95	10.04	10.51	12.25	11.47
<i>35-39</i>	13.28	11.36	16.78	9.19	12.42	11.58	12.84
<i>40-44</i>	11.62	11.36	12.94	8.76	9.71	10.39	13.18
<i>45-49</i>	12.00	10.17	10.42	9.19	9.08	11.58	10.10
<i>50-54</i>	10.86	11.36	9.54	9.61	10.03	12.12	11.13
<i>55-59</i>	4.98	8.47	4.60	12.82	13.85	11.32	9.76
<i>Mean (in years)</i>	35.85	36.63	35.84	35.57	37.09	37.5	37.09
<b>Religion</b>							
<i>No religion</i>	11.49	23.73	28.95	16.88	21.66	18.24	10.10
<i>Catholic</i>	51.34	39.32	30.15	29.70	32.17	37.95	43.66
<i>Evangelical</i>	32.18	29.49	31.69	43.38	16.24	29.43	40.75
<i>Others</i>	4.72	6.95	8.11	8.97	29.46	12.92	5.14
<b>Income</b>							
<i>Until 1/2 wage</i>	27.97	23.22	20.94	9.40	16.56	8.65	17.47
<i>Until 1 wage</i>	13.03	12.20	14.25	11.11	10.51	5.73	12.33
<i>Until 2 wage</i>	16.35	10.68	14.03	18.80	18.95	18.24	10.44
<i>Above 2 wages</i>	6.00	5.76	4.39	10.68	9.87	14.91	4.79
<b>Relationship status</b>							
<i>Have a partner</i>	63.86	54.24	62.17	59.83	61.15	55.92	57.53
<i>Have a ex-partner</i>	25.41	26.61	27.30	25.00	27.39	28.23	24.66

Source: elaborated by the author.



According to the table, most of the respondents live in Salvador (912 women or 19.22%), followed by Fortaleza (783 women or 16.50%) and São Paulo (751 women or 15.82%). Moreover, 628 women live in Porto Alegre (13.23%), 590 in Recife (12.43%), 584 in Belém (12.30%) e 468 in Goiânia (9.86%).

In relation to race, the majority of women declared themselves to be *pardo* and the highest rates were in the cities of Fortaleza, Belém and Goiânia. Porto Alegre and São Paulo, which presented the lowest rates, are the cities with more women who declared themselves white. Salvador was the only city where the majority declared themselves black.

Regarding education, most women have completed High school or have incomplete Tertiary education. In Salvador, São Paulo and Belém the rates were the highest. Tertiary education presented the lowest prevalence among the cities and Porto Alegre and São Paulo have the lowest and highest percentages of women with Tertiary education completed, respectively. Moreover, in relation to women who have no formal education, the inverse is true, São Paulo has the lowest rate while Porto Alegre has the highest.

As presented by Table 4, the distribution of ages among the cities is very similar. In the sample, the average age of respondents is 36.5 years. São Paulo, Porto Alegre and Belém presented the highest average age, also, in these cities the percentage of women aged 55 and 59 years is higher than those aged 14 and 19 years, in contrast to the other cities. In all cities, most women are between 25 and 39 years old, with the exception of Goiânia, where the women are younger.

Considering religion, Table 4 presents that catholic women are the majority in all cities, except Salvador and Goiânia, where the respondents are mostly evangelical. The percentage of women who belong to other religions and creeds (e.g. Jehovah's Witnesses, Spiritism, Mormon, Candomblé and others) is outstanding in the city of Porto Alegre in relation to the others whose rates are considerably lower. Similarly, but in a much smaller proportion, women without religion are the majority in Salvador.

Regarding the income of participants, only 1,914 women reported the gross monthly income from work, with the average value being R\$ 1,316. In addition to the wage, the receipt of social benefits, retirement, alimony or monetary donations in the last month prior to the survey was also considered. In the sample, 1,123 women answered that they received at least one of these benefits. Most of them, 835 women, received the governmental benefit *Bolsa Família*, in which the average value was R\$163.70. Moreover, most of these women were from Fortaleza

(26.47%) and Salvador (21.80%).

In relation to the other benefits, 102 women responded that they were retired, with an average value of R\$1,400; 79 women responded that they received alimony or monetary donations, with an average value of R\$544.60; 48 women received the *Benefício de Prestação Continuada* (BPC-LOAS) of the Federal Government, with an average value of R\$973.50; 19 women received unemployment insurance, with an average value of R\$1,134 and 63 women answered that they received other benefits from social programs from the municipal, state, or federal government, with an average amount of R\$ 935.10. Moreover, the majority of the recipients of these benefits were from Porto Alegre, with the exception of the BPC-LOAS whose women from Salvador were also the majority of recipients.

In Table 4 the monthly income is measured in minimum wages for the year 2019, R\$ 998.00, and considers all these sources of income, wage from work and benefits. As observed, most women affirmed they earned up to 1/2 minimum wage monthly, Fortaleza presented the highest percentage of women while São Paulo had the lowest. Moreover, São Paulo, Goiânia and Porto Alegre presented the highest percentage of women with above 2 wages. On the other hand, Fortaleza, Recife and Salvador presented the highest percentage of women with until 1/2 wage.

Concerning relationship status, 2,826 women reported having a current intimate partner and 1,258, a former intimate partner. It is worth noting that for the PCSVDF-Mulher a partner refers to a person with whom the woman has an intimate relationship involving physical and/or emotional intimacy, regardless of the legal status of the relationship and whether or not the two reside together. The same applies to ex-partner if the woman is single but had a partner previously. Thus, 4,084 women in the sample have an intimate partner or ex-partner. Table 4 presents the frequencies of women's relationship status by city.

These 4,084 respondents were asked to report cases of sexual violence experienced throughout their lives perpetrated by their current partner or by any other partners they had. This question is the *Q711* present in Table 3 and Figure 1. Table 5, below, presents the prevalence rates of each violent action by city.

The percentage of women who responded positively to at least one of the violent actions (Sexual IPV in the last column) was 10.19%, which corresponds to 416 women. This number, therefore, represents the prevalence of sexual IPV given the occurrence of at least one of these cases presented in Table 5. Also, as shown in the table, the total prevalence of women who were forced to have sex when they did not want to was 7.32%. Moreover, it is also possible

Table 5 – Sexual IPV by city (perc. freq.)

<b>Violent action</b>	<b>Fortaleza</b> (n = 699)	<b>Recife</b> (n = 477)	<b>Salvador</b> (n = 816)	<b>Goiânia</b> (n = 397)	<b>Porto Alegre</b> (n = 556)	<b>São Paulo</b> (n = 632)	<b>Belém</b> (n = 480)	<b>Total</b> (n = 4,084)
<i>Forced to have sex when she did not want to</i>	7.01	7.58	8.09	11.59	8.27	4.90	4.79	7.32
<i>There was sexual intercourse, without the use of physical violence, as she was afraid of his reaction if she said “no”</i>	6.58	5.66	4.66	9.82	5.75	4.90	3.12	5.61
<i>Forced her to do something during intercourse that she found degrading or humiliating</i>	5.15	4.40	3.43	7.30	5.40	2.21	2.71	4.19
<i>During a consensual sexual act, he removed the condom without her consent</i>	2.00	3.14	1.84	6.04	3.60	1.42	1.67	2.57
<i>Sexual IPV</i>	10.01	11.53	9.19	17.88	12.05	7.44	6.25	10.19

Source: PCSVDF-Mulher and elaborated by the authors.

to observe that as the acts become more specific or severe, prevalence rates decrease.

In addition, as observed in the table, Goiânia, Porto Alegre and Recife were higher than the average prevalence of 10.19% for the entire sample. These cities, together with Salvador, also presented higher percentages of forced sexual acts. Furthermore, Goiânia distinguishes because it has much higher rates than the other cities in all cases.

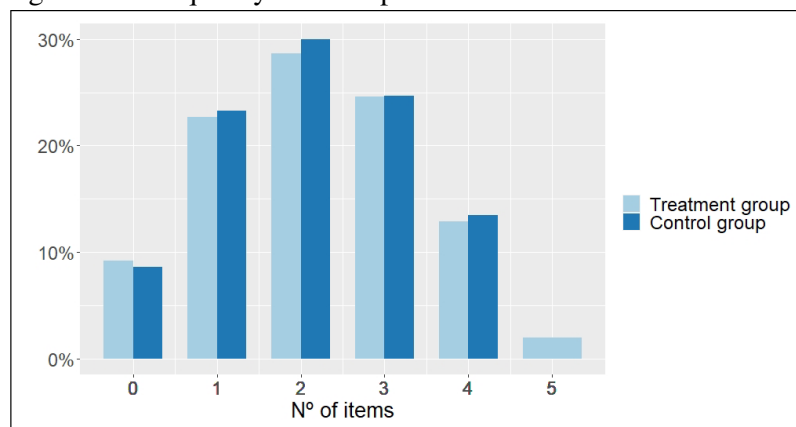
## 5 ANALYSIS OF RESULTS

In this section, the results of the list experiment, presented in Subsection 3.4 and the econometric model are presented. The control group consisted of 2,382 women who received the four neutral statements, and the treatment group had the remaining 2,364 who received the same list but with the sensitive item. Moreover, each woman was randomly selected into the two groups.

### 5.1 List experiment preliminary results

In the control group, most of the respondents (714 women or 29.78% of the group) answered that they experienced 2 of the items. Likewise, for the treatment group, the majority also answered 2 items (678 women or 28.56% of the group). Figure 2 presents the frequency of answers for each group, which are almost identical. There are few women who did not answer any item and likewise who answered all items, which could characterize floor and ceiling effects, respectively. Therefore, such effects can be ruled out.

Figure 2 – Frequency of list experiment answers



Source: elaborated by the author

The way to measure the prevalence of sexual violence caused by any perpetrators except intimate partner or ex-partner — the sensitive item — is means of the difference between the average responses of the treatment and control groups, as described previously. Table 6, below, presents the average response of each group and the difference between them. The prevalence obtained was 0.041 or 4.1%. To measure the sensitive bias or misreporting, this prevalence obtained by the difference in means must be compared with the prevalence measured by the direct question asked after the experiment.

Table 6 – Difference in means

Mean – Treatment group	Mean – Control group	Difference (T – C)
2.153 (1.23)	2.112 (1.16)	0.041 (0.035)

Source: elaborated by the author.

Note: Standard error in parenthesis.

When the sensitive statement “*Has anyone ever forced you to have sex or perform a sexual act when you did not want to?*” was directly asked (*q802\_1* in Figure 1 and Table 3), 401 women (8.4%) reported that they had already been victims of this form of sexual violence. Most of them, 4,324 women (91%), denied it and only 21 women did not inform or did not know how to respond. Moreover, the respondents were asked who was the perpetrator of the previously reported sexual violence. It must be reminded that this question considered all perpetrators except intimate partner or ex-partner. Thus, to make it comparable with the prevalence obtained by the experiment, it is necessary to disregard those who wrongly answered only partner or ex-partner.

Seven women did not want to answer the question about who the perpetrator was, and they were disregarded. Thus, 394 women (8.30% of the sample) who answered affirmatively to the direct question about sexual violence were considered. Table 7 presents in absolute values and percentages the prevalence of sexual violence for each perpetrator mentioned, for the entire sample and divided between treatment and control groups.

As observed in Table 7, 124 women reported a partner or ex-partner as the perpetrator. Moreover, in relation to these women, it was observed that 59 of them denied or did not answer the first question presented in Table 5, which refers to sexual violence perpetrated by the partner or ex-partner, and which is similar to the direct question of the list experiment “*Forced to have sex when she did not want to*” (*q711* in Table 3 and Figure 1). These 59 women, thus, may have lied or omitted cases of sexual violence perpetrated by an intimate partner or ex-partner and only revealed the truth at a later moment in the survey possibly because they felt more comfortable answering as the survey proceeded.

It can also be observed that 273 women reported as perpetrators at least anyone except intimate partner or ex-partner, which results in a rate of 5.75%. This prevalence obtained by direct questioning can be compared with the rate observed in the list experiment, 4.1% to measure sensitivity bias or misreporting.

Because the prevalence obtained by the list experiment was lower than that obtained

Table 7 – Prevalence of sexual violence by perpetrators

<b>Perpetrator</b>	<b>Treatment group</b> (n = 2364)	<b>Control group</b> (n = 2382)	<b>Total sample</b> (n = 4746)
Father	5 (0.21)	13 (0.55)	18 (0.38)
Stepfather	13 (0.55)	17 (0.71)	30 (0.63)
Uncle	2 (0.08)	3 (0.13)	5 (0.10)
Another male family member	39 (1.65)	30 (1.26)	69 (1.45)
Male family friend	14 (0.59)	14 (0.59)	28 (0.59)
Female family friend	0 (0)	2 (0.08)	2 (0.04)
Other friends	19 (0.80)	21 (0.88)	40 (0.84)
Neighbor/Acquaintance	4 (0.17)	4 (0.17)	8 (0.17)
Boss or superior	5 (0.21)	6 (0.25)	11 (0.23)
Work colleague	0 (0)	2 (0.08)	2 (0.04)
Teacher	1 (0.04)	2 (0.08)	3 (0.06)
Policeman/Soldier	2 (0.08)	1 (0.04)	3 (0.06)
Stranger	43 (1.82)	39 (1.64)	82 (1.73)
Priest/Religious	1 (0.04)	0 (0)	1 (0.02)
Doctor	1 (0.04)	0 (0)	1 (0.02)
Partner or ex-partner	60 (2.54)	64 (2.69)	124 (2.61)
At least someone except partner or ex-partner	134 (5.67)	139 (5.83)	273 (5.75)

Source: elaborated by the author

Note: Percentage values in parenthesis.

by direct questioning, no sensitivity bias could be found. This result is similar to others observed in Subsection 3.3, such as Agüero and Frisancho (2022), Gilligan *et al.* (2021) and Koos and Traummüller (2022). Agüero and Frisancho (2022), moreover, attributes this absence of misreporting to the fact that their survey is well adjusted to the recommended methodological guidelines for dealing with violence, which eventually makes respondents more comfortable in directly reporting, and thus affecting the performance of the list experiment.

### 5.1.1 Test of design effects

Following the procedure of the test, described in the Subsection 3.2.1, for detecting design effects, Table 8 presents the estimated proportions of respondent types,  $\hat{\pi}_{yz}$ , for each item of the list experiment. The  $p$  value obtained in the test was 0.721.

Table 8 – Estimated proportions of respondents

$y$	$\hat{\pi}_{y0}$	Standard errors	$\hat{\pi}_{y1}$	Standard errors
0	9.18	0.59	-0.62	0.83
1	23.29	1.12	0.01	1.35
2	28.67	1.93	1.31	1.41
3	23.27	1.24	1.41	1.01
4	11.49	0.76	1.99	0.29

Source: elaborated by the author

As observed, there is a negative estimated proportion of women who answered 0 neutral items but answered positively the sensitive item ( $\hat{\pi}_{y1, y=0}$ ). Thus, to verify if this is due to the presence of design effects the Bonferroni correction was used. Under a  $\alpha = 0.01$ , it was not possible to reject the null hypothesis. Therefore, the presence of design effects can be discarded.

## 5.2 Econometric results

Econometric models were estimated in order to observe which groups of women are more prone to omit sexual violence when questioned directly but revealed indirectly by the experiment. The dependent variable corresponds to the number of statements from the experiment that all women responded to, in both groups, and the explanatory variables consist of some characteristics of the respondents. The choice of variables was made based on the studies of Agüero and Frisancho (2022), Cullen (2020) and Joseph *et al.* (2017). Table 9 presents all these variables and their descriptive statistics. It is worth mentioning that the dummy variable representing the city of Fortaleza was omitted from the models, serving as a benchmark for the other cities.

Two regression models composed of the variables presented previously were estimated by the Maximum Likelihood (ML) method developed by Imai (2011), as described in Subsection 3.2, one of them considers the city dummies and the other does not. As presented earlier, the ML method is one of the most appropriate for modeling responses of list experiment:

Table 9 – Descriptive statistics of variables

Variable	Description	N° of observations	Mean	Standard deviation
Response	Dependent variable. Indicates the number of items answered by the woman	4,746	2.132	1.196
White	Dummy, 1: If she is white and 0: other races;	4,716	0.276	0.447
Fundamental	Dummy, 1: If she has a fundamental education and 0: other cases;	4,742	0.235	0.424
High school	Dummy, 1: If she has a high school education and 0: other cases;	4,742	0.495	0.50
Undergraduate	Dummy, 1: If she has an undergraduate education and 0: other cases;	4,742	0.105	0.306
Partner	Dummy, 1: If she has a partner and 0: does not have;	4,734	0.598	0.490
Age	Numerical, age of woman;	4,727	36.5	12.489
Recife	Dummy, 1: If she lives in Recife and 0: does not live;	4,716	0.125	0.331
Salvador	Dummy, 1: If she lives in Salvador and 0: does not live;	4,716	0.193	0.395
Goiânia	Dummy, 1: If she lives in Goiânia and 0: does not live;	4,716	0.099	0.299
São Paulo	Dummy, 1: If she lives in São Paulo and 0: does not live;	4,716	0.159	0.366
Porto Alegre	Dummy, 1: If she lives in Porto Alegre and 0: does not live;	4,716	0.133	0.340
Belém	Dummy, 1: If she lives in Belém and 0: does not live;	4,716	0.124	0.329

Source: elaborated by the author

Imai (2011) describes ML as more statistically efficient than NLS and Tsai (2019) points out that estimates by OLS can result in irrational predictions in this case. The estimation results, thus, are presented in Table 10.

According to the table, in the model without the cities, the variables High school, Undergraduate, Age and Age<sup>2</sup> presented statistical significance. In the model that considers the cities, the variables White and Partner were statistically significant and the cities variables Recife, Salvador, Goiânia and São Paulo were also statistically significant. By the signs of the coefficients, the results pointed out that women with High school and Undergraduate education tend to report more sexual violence suffered in the experiment or to omit when asked directly, similar to the results of Agüero and Frisancho (2022), Cullen (2020) and Joseph *et al.* (2017). In addition, older women are more likely to report sexual violence by the list experiment, similar to Joseph *et al.* (2017), while younger women are less prone. Alternatively, white women, women with a partner and women from Recife, Salvador and Goiânia cities tend to omit fewer this kind of violence. Only São Paulo presented a positive coefficient, indicating more omission among the women.



Table 10 – Maximum likelihood results

Variable	Without cities dummies	With cities dummies
Intercept	-0.747 (1.27)	1.09 (1.346)
White	-0.099 (0.296)	-0.539** (0.267)
Fundamental	0.707 (0.114)	0.366 (0.397)
High school	0.818* (0.478)	0.02 (0.407)
Undergraduate	1.507** (0.591)	0.181 (0.507)
Partner	-0.442 (0.281)	-0.648*** (0.246)
Age	-0.171** (0.068)	-0.104 (0.71)
Age <sup>2</sup>	0.002*** (0.001)	0.001 (0.001)
Recife		-0.987* (0.600)
Salvador		-0.844* (0.478)
Goiânia		-2.968*** (0.774)
São Paulo		1.152** (0.457)
Porto Alegre		-0.439 (0.726)
Belém		-0.426 (0.55)

Source: elaborated by the author.

Note: Standard errors in parenthesis.

Significance level: \*\*\*  $\leq 1\%$ ; \*\*  $\leq 5\%$ , \*  $\leq 10\%$ .

In relation to the interpretation of these coefficients, due to the logistic parameterization of the models, the coefficients can be interpreted by odds ratios (TSAI, 2019). Thereby, in this case, the antilogarithm of each coefficient is used. Thus, according to the model, *ceteris paribus*, in relation to education, women with High school and Tertiary education have 2.27 ( $\approx e^{0.818}$ ) and 4.51 ( $\approx e^{1.507}$ ) more chances, respectively, to report sexual violence by list experiment or to omit when asked directly. Concerning the age, there was a change in the sign of coefficients, by the variable Age, one can point out that women up to a certain age have 0.84 ( $\approx e^{-0.171}$ ) fewer chances to omit the sexual violence they have suffered. On the other hand, by the variable Age<sup>2</sup>, older women have 1 ( $\approx e^{-0.002}$ ) more chances to omit violence, reporting it more in the list experiment.

On the other hand, white women and women with a partner have 0.58 ( $\approx e^{-0.539}$ ) and 0.52 ( $\approx e^{-0.648}$ ) less chances to omit sexual violence, respectively. Also, in relation to the

cities, women from Recife, Salvador and Goiânia presented respectively 0.37 ( $\approx e^{-0.987}$ ), 0.43 ( $\approx e^{-0.844}$ ) and 0.05 ( $\approx e^{-2.968}$ ) fewer chances to omit while women from São Paulo have 3.16 ( $\approx e^{1.152}$ ) more chances to omit and, hence, to report more sexual violence in the list experiment.

## 6 FINAL CONSIDERATIONS

This study sought to assess the misreporting of women who experienced sexual violence committed by people other than some intimate partner or ex-partner in the PSCVDF-Mulher survey. For this purpose, an indirect questioning method, the list experiment, was used. Since cases of violence can be characterized as a sensitive item for surveys, direct questioning may produce inconsistent or underestimated results.

The preliminary results indicated that the applied experiment was well adjusted to the essential hypotheses of no design effects and no floor and ceiling effects. Despite the fact that no sensitivity bias could be observed, the econometric results pointed to underreporting for the older groups of women, for those with higher education and for women from São Paulo. On the other hand, white women, women with a partner and women from Recife, Salvador and Goiânia cities tended to overreport the violence suffered by the list experiment.

The reasons behind these results can be diverse and are beyond the scope of this paper. But the results obtained can give indications about how social and cultural pressures, such as social desirability, affect older women, who, perhaps because they grew up in more conservative times, tended to normalize violence against women. Similarly, women with higher education, even with a higher level of education, may feel coerced to submit to social norms, by the social position or status they may occupy. Moreover, characteristics not observed in the city of São Paulo, such as services for reporting and supporting victims, may contribute to the omission of women. Future research can be conducted to investigate what these heterogeneous characteristics are among the cities that interfere with a woman's decision to report or not the sexual violence she has suffered.

Besides presenting the groups of women most vulnerable to misreporting sexual violence, these results point out that these groups of women should receive more attention when reporting the sexual violence they have been victims of. In this way, public policies can be implemented in order to prioritize a more comfortable and less threatening service for these women when seeking help or making reports in specialized places for such.

With respect to the list experiment, this study presented how this methodology can be employed and that its results are positive. However, improvements can be made to it, in order to enhance its performance, especially in the context of PCSVDF-Mulher. Other approaches to the experiment can be used, such as the double list experiment. In addition, the moment at which the experiment is conducted can be modified for certain women interviewed, in order to verify

whether the fact that the experiment is conducted during the violence case section can in any way impact the women's responses. It can also be used for other types of violence.

Therefore, in a country where the dimension of sexual violence is often unknown or underestimated, given the scarcity of accurate data, this work sought to contribute to improvements in the discussion of this problem, presenting a new approach to questioning and generating valuable information that can help overcome one of the biggest problems of public health and development that is sexual violence.

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## APPENDIX A – DIFFERENCE IN MEANS ESTIMATOR

As described by Miller (1984), the prevalence of the sensitive item is obtained by the difference between the average responses of treatment and control groups. This estimator is presented in the Equation (3.1), which requires the assumptions of no design effects and no liars. This appendix describes how the difference in means estimator is obtained according to the notation of Blair and Imai (2012).

The authors denote  $Z_{i,j}(t)$  as the respondent  $i$ 's binary preference for the  $j^{\text{th}}$  item from the list, where  $t$  indicates which group the respondent belongs to,  $t = 0$  if control group and  $t = 1$  if treatment group. Thus, e.g.,  $Z_{i,1}(0) = 1$  indicates that respondent  $i$ , from the control group, agrees with item 1. Likewise,  $Z_{k,1}(1) = 1$  represents that the respondent  $k$ , from treatment groups, also agrees with item 1. The sensitive item is denoted as  $j + 1$ , this way, it is not possible to obtain  $Z_{i,j+1}(0) = 1$  since the control group does not receive the sensitive item.

How  $Z_{i,j}(t)$  represents the preference for one item in the list, the participant's response to the experiment is given by the number of items he/she agrees with. Blair and Imai (2012) denotes this response as  $Y_i(0) = \sum_{j=1}^J Z_{i,j}(0)$  and  $Y_i(1) = \sum_{j=1}^{J+1} Z_{i,j}(1)$ , for the control and treatment groups, respectively. In addition, it is possible to define  $Y_i = Y_i(T_i)$ , where,  $T = 0, 1$ , indicating the respondent's group.

Furthermore, Blair and Imai (2012) describe the assumption of no design effects as  $\sum_{j=1}^J Z_{i,j}(0) = \sum_{j=1}^J Z_{i,j}(1)$ , i.e., it is expected that the inclusion of the sensitive item does not modify the response to the neutral  $j$  items. Also, the assumption of no liars is denoted as  $Z_{i,j+1}(1) = Z_{i,j+1}^*$ , where  $Z_{i,j+1}^*$  is the truthful response to the sensitive item.

Therefore, given the responses of each group,  $Y_i$ , the difference in means estimator is denoted by the expression below:

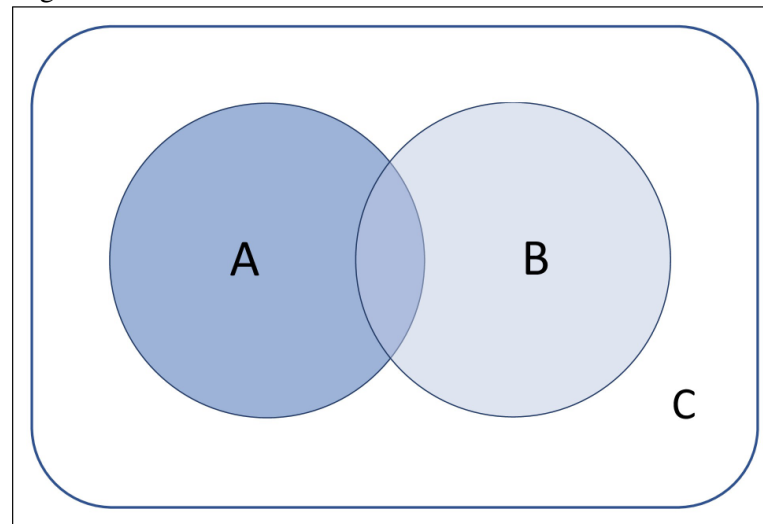
$$\hat{\tau} = \frac{1}{N_1} \sum_{i=1}^N T_i Y_i - \frac{1}{N_0} \sum_{i=1}^N (1 - T_i) Y_i, \quad (\text{A.1})$$

where  $N_0$  and  $N_1$  are the size of the control and treatment groups, respectively, and  $T$  indicates the groups to which the respondent belongs.

## APPENDIX B – MEASURING SEXUAL VIOLENCE VICTIMIZATION IN THE PCSVDF-MULHER

PCSVDF-Mulher uses two definitions for groups of perpetrators: 1) those who are partners or ex-partners and 2) those who are not. Together they form the set of all possible perpetrators. Figure 3 illustrates the possibilities for measuring sexual violence victimization among the sets of possible perpetrators.

Figure 3 – Victimization in PCSVDF-Mulher



Source: PCSVDF-Mulher and elaborated by the author

Set  $A$  represents the women who responded intimate partner or ex-partner as perpetrators, while set  $B$  represents all other perpetrators. Set  $C$ , in turn, corresponds to all women who participated in the PCSVDF-Mulher. Thus:

- $A \cup B$ : victims of sexual violence, regardless the perpetrator;
- $A \cap B$ : victims of sexual violence perpetrated by partner or ex-partner AND someone else;
- $A \setminus (A \cap B)$ : victims of sexual violence perpetrated ONLY by partner or ex-partner;
- $B \setminus (A \cap B)$ : victims of sexual violence perpetrated ONLY by anyone except partner or ex-partner;
- $C \setminus (A \cup B)$ : non-victim.