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Intimate Partner Violence: Comparison between Empirical Data and Stochastic Agent-Based Modeling

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Ai miei genitori, Claudia e Antonio.

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Abstract

Intimate partner violence (IPV) is a complex and preventable issue that involves not only victims and aggressors but also individuals that surrounding them (e.g., families, friends etc.), and the communities and society where they live. Literature review presents several theories that try to understand IPV dynamics. Recent promising prevention programs are the bystander interventions in which all individuals might play a positive role in reducing IPV. So far, a few studies investigated the IPV dynamics by means of alternative approach in the field of social psychology such as agent-based modeling (ABM).

The current research attempted to examine the dynamically interactive processes within IPV system by means of different methods (e.g., qualitative, quantitative and ABM) and tried to compare their results, in order to obtain a broader understanding of this phenomenon and the factors that might decrease it.

Applying a socio-ecological IPV bystander intervention model, the empirical studies presented in this thesis sought to describe (First qualitative study) and evaluate (Second quantitative study) the factors that could affect individuals' decision to help someone involved in IPV situations. Both studies use online instruments to collect data. For this reason, first of all, three preliminary studies was conducted in order to assess how individuals behave in online environments.

The online qualitative study included 49 Italian university students and found an interconnected group of individual, relational and situational factors that a potential bystander considers during their choice to intervene towards a friend victim of IPV. In particular, participants were more willing to help if they perceived the situation as more severe and they preferred to intervene if they would be with a peer group and know the aggressor. Moreover, some gender differences appeared.

The online quantitative study involved 1128 Italian, Brazilian, and French-Canadian university students and allowed us to explore macrosystem influence on bystander intervention. Participants reported their intent to engage in helpful bystander behaviors towards a friend and a stranger and they were more willing to help the first than the second. Multivariate analysis showed that factors, that affect both the intent to help a friend and a stranger, were peer helping norms, self-efficacy (i.e., generalized and specific to deal with violence as a bystander), knowledge/training about IPV, and female gender. By comparing the results among the subsamples, Italian university students reported less intent to help a friend and a stranger. Italian, Brazilian, and Canadian participants differed for a few factors. Peer helping norms, bystander self-efficacy to deal with violence and knowledge/training about IPV were among the most important factors that influenced the intent to help a friend and a stranger.

The two stochastic agent-based models simulated the influence of individual (i.e., aggressiveness) and contextual (i.e., perceived violence and received informal social support) parameters on the evolution of a couple at risk of IPV. Some simulation results were in accord with previous studies. The first model suggests that when aggressiveness is supported by gender specific violence, a "clique" of similar violent behavior might arise in a society. The second model recommends the importance to provide informal social support to victim and aggressor regardless gender.

To conclude, the comparison of the results point out that members of own informal social networks have a key role on IPV dynamics because they might support or reduce the problem depending on the social norms which they are bearing in their communities and society.

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Chapter 1

Introduction

Intimate partner violence (IPV) is a significant and preventable problem that is present in all societies of the world [195]. A general definition of IPV refers to patterns of psychological aggression and stalking, and various forms of violence as physical and sexual that may include coercive methods committed by an intimate partner or ex-partner [55]. Even if some data about prevalence of IPV showed that both men and women may be victims of IPV (e.g., [48, 341]), women are more likely to suffer the most severe forms of violence such as sexual violence [298, 325, 380], and the most serious consequences such as injuries [61, 85, 353] and post-traumatic stress disorder [91, 172].

IPV is characterized by complex patterns [195] and literature presents several theories that sought to describe this issue [10]. One of the most used theory is the ecological perspective [10, 57] that was applied to understand IPV [159, 195]. This approach endorses the idea of embedded levels of causality and it hypothesizes the risk factors of violence as probabilistic [158] and, therefore, IPV is the emerging outcome of the interactions among individual, relationship, community, and societal factors [195].

Other theories have been focused on dynamics of IPV such as the Cycle of Violence theory [368], the Duluth model of Power and Control Wheel [272], and the Family Systems theory [131]. Recently, some researchers showed that these models assume different patterns of violence that may be expressed by means of dynamic patterns coming from complexity science: periodic, random and chaotic [63, 176, 177, 179] (see section 2.1.3). The patterns of violence are not mutually exclusive but they may change within an abusive

relationship according to the available resources such as support [63,177,179].

Literature points out that social support should be considered as protective factor IPV victimization and perpetration [75]. However, social support may be also negative and unhelpful [344] as condoning the use of violence within relationships [383], blaming the victim, minimizing the abuse, etc. [354].

In order to try to reduce IPV, new promising prevention interventions start to focus on community members to give them a positive role in reducing this issue, increasing their sense of responsibility and collective efficacy [29]. Indeed, IPV is not always a private matter but it also occurs in front of a third person defined in the literature as a bystander [151,279], and sometimes a witness of IPV does not know how help and support [151].

In social psychology, the majority of social problems and phenomena such as IPV have been mainly examined by means of qualitative, quantitative or mixed-methods. As suggested by Smith and Conrey [329], an alternative and complementary method is the agent-based modeling (ABM). This approach allows understanding how individual interactions and context influences may generate an emergent complex collective phenomena [251]. ABM is useful when the objective of the research seeks to capture the dynamically interactive processes among micro and macro levels of a social phenomenon [329]. Moreover, it consents of simulating processes that are impossible or unethical to study with empirical data coming from real environments [251]. Recently, the help-seeking behaviors of IPV victims were simulating by means of ABM, highlighting how this innovative approach allows a different comprehension of IPV dynamics by also assessing various policy implications [109].

1.1   The Objective

The general aim of the present research is to model the dynamics of IPV through the application of stochastic agent-based modeling, analyzing the influence of individual and social parameters and comparing simulation models with empirical data from past literature and implemented research studies.

The empirical studies developed in this dissertation have focused on new areas of research and intervention where the target is not the victim or the aggressor but other individuals who might play the role of a bystander (i.e., people who know individuals who are experiencing abusive relationships, or even they have been eyewitnesses of IPV incidents) [54]. With differ-

ent methodologies (i.e., qualitative and quantitative methods), these studies seek to understand which sets of factors influence the individuals' choice to help someone involved in IPV circumstances. Three characteristics of the empirical studies might be relevant: a) the use of online setting such as web-based questionnaires and synchronous online focus groups, since individuals may feel uncomfortable talking in the presence of others about sensitive and private issues such as IPV [185]; b) the focus on university students given the high rates of IPV within that population over the world [341]; and c) the analysis of quantitative data coming from different countries (e.g., Italy, Brazil and Canada), since cross-cultural studies capture macrosystem influence on bystander intervention [27]. In addition, three preliminary studies were performed to assess some social and group processes in online environments, since empirical studies presented in this thesis about bystander intervention in IPV situations have used online tools to collect data.

By means of the development of two stochastic agent-based models, this dissertation tries to examine in a holistic way the dynamics of IPV. First, a "short-time evolution" model explored how individuals' tendency to be aggressive and hostile towards the partners (i.e., individual parameter), and the perception of violence in their social network (i.e., contextual parameter) may give rise to the occurrence of violent behaviors within a couple (i.e., macroscopic social phenomenon). Secondly, the short-time evolution model has been adapted to investigate the effect of informal social support (i.e., contextual parameter) on the long-term dynamics of a couple at risk of IPV ("long time-span behavior" model). According to the suggestion by Smith and Conrey [329], this dissertation try to apply both qualitative, quantitative and ABM methods to IPV dynamics in order to capture a more inclusive overview of this issue by means of a data comparison at both of these levels.

1.2 Contributions

This thesis is organized into six chapters that may be divided in four main parts: A) a preliminary theoretical framework, which includes the Chapter 2; B) an empirical part, which consists of the Chapters 3, 4, and 5; C) an agent-based model part, which includes the Chapter 6; and D) a conclusion part, which consists of the final Chapter 7.

More specifically, Chapter 2 presents an exploratory theoretical background related to the dissertation topics. Firstly, it provides an overview of

intimate partner violence (IPV), describing an ecological approach of IPV risk factors, traditional theories of IPV dynamic patterns and their recent interpretations by means of different mathematical models of complex dynamics patterns. Then, this chapter introduces the reader to some studies about the effect of social support, especially informal one, on the IPV dynamic patterns and it also presents a recent prevention approach of IPV prevention such as bystander approach. Lastly, the agent-based modeling (ABM) method has been illustrated as a different approach in social psychology, highlighting its advantages and disadvantages and discussing the application of ABM to social phenomena such as IPV. Moreover, the main features of stochastic systems are explained as well as some examples of their implementation, in order to describe methods applied in the stochastic agent-based models presented in this dissertation.

Chapter 3 presents three contributions about preliminary studies that aimed to analyze how social phenomena such as excessive self-presentation, emotional contagion, and collaborative facilitation and inhibition may develop in online environments such as Social Networks and online group chats. The main results of the first two preliminary studies confirm that linguistic analysis may be a useful tool for studying the psychological dynamics within virtual environments. Moreover, the third preliminary study indicates that virtual environments may give rise to social scripts, becoming a setting where it is possible to develop social strategies for problem-solving. Overall, these studies have contributed providing insights for the methodological approach of the empirical studies of this thesis.

Chapter 4 represents an exploratory study that uses online qualitative research tools and tries to describe the university students' perceptions of IPV hypothetical scenarios in order to understand which factors bystanders consider during their choice to help a friend victim of IPV. The main important findings show an interrelated set of relationships among individual, relational and situational factors that positive or negative influenced their decision to act. In particular, gender differences emerge, individuals feel more comfortable offering help to a victim within a group context and being a friend of a perpetrator increases the sense of self-confidence to directly intervene.

Chapter 5 presents a cross-cultural study that seeks to examine the bystander intention to help a friend and a stranger in IPV situations among Italian, Brazilian and Canadian university students by means of an online

quantitative research design. Results show that participants are more will-
ing to help a friend than a stranger and the variable that most affect the
intent to help is the perception of peer helping norms. Self-efficacy and
knowledge/training about IPV are other influential factors. Moreover, fe-
male participants seem to have more intent to help. With regard to the
comparison among the countries of data collection, Italian university stu-
dents reported less intent to help a friend and a stranger than Canadian
and Brazilian counterparts. Moreover, Italian, Brazilian and Canadian uni-
versity students' intents to help a friend and a stranger were affected by
more similar than different factors. Shared influential factors for intent to
help a friend are 1) perception of peer helping norms and 2) self-efficacy to
deal with violence as a bystander; and for intent to help a stranger are 1)
perception of peer helping norms and 2) knowledge/training about IPV.

Chapter 6 proposes two stochastic agent-based models in which the mem-
bers of a couple may assume a finite number of states that they update in a
probabilistic way at discrete time steps. In both models, the individual pa-
rameter also evolves on the basis of message coming from the environments.
Simulation results found the emergence of peculiar patterns in agreement
with the literature about IPV and some interesting findings such as "cliques"
of similar gender violent behaviors, and dynamics of informal social support
on the separation of the abusive couple.

Finally, Chapter 7 presents a general discussion and conclusions of the
findings of empirical (Chapters 4 and 5) and ABM (Chapter 6) studies for
gaining a more inclusive overview of IPV dynamics. Hence, the final chapter
seeks to outline, discuss and compare the main results of the studies of
this dissertation, reporting also the main limitations of studies and the most
relevant research and practical implications. Moreover, suggestions for future
research are reported.

Chapter 2

Literature review

This chapter summarizes the relevant literature related to the dissertation topics. First, an overview of intimate partner violence (IPV) is presented with a focus on the ecological framework of IPV risk factors, the dynamic patterns observed in IPV such as the Cycle of Violence theory, the Family Systems theory and the Duluth Model of Power and Control Wheel, and the recent application of complexity science on the IPV dynamics patterns. Second, studies that investigated the effect of social support on the IPV dynamic patterns are described. Third, given the importance of prevention as a strategy to reduce IPV rates, this chapter also includes the presentation of the emergent bystander approach in the field of IPV and of the factors that may influence bystander behavior during an IPV situation. Fourth, the agent-based modeling (ABM) approach has been presented as an alternative method in the field of social psychology and, especially, in the case of IPV and, finally, the main features of stochastic systems are illustrated.

2.1 Intimate Partner Violence: Overview of the Problem

Intimate partner violence (IPV) is a significant social problem, present all over the world [195]. IPV is characterized by physical, sexual, psychological

violence or stalking inflicted by a current or past intimate partner [55]. Despite the fact the IPV is characterized by four main types of violence (Table 2.1), various forms of abuse usually coexist over time in the same relationship [195]. For example, one study found that 40% of women victims of IPV stated both physical and sexual violence [231]. Another study found that 43% victims of sexual violence also indicated reported physical or psychological violence [386]. These results highlighted that *"IPV is much more complex and multidimensional, defying simplistic explanations"* [68, p. 42].

Although IPV may affect both genders, the presence of a gender symmetry in reported some types of IPV perpetration does not indicate symmetry in consequences [11]. For instance, women victims of IPV are far more likely than men to sustain more injuries [61, 85, 353], they are more fearful of their perpetrator partner [119, 370], and they have a higher probability of suffering post-traumatic stress disorder (PTSD) for IPV experience [91, 172]. Moreover, women are at greater risk of being a victim of sexual violence than men [298, 325, 380]. As described by Caldwell and colleagues [68], because of cultural factors that generally attribute greater power to the male gender, women are more likely than men to suffer contextual factors that disempower them, increasing the likelihood of severe violence (i.e., sexual abuse) that raises the risk of negative effects (i.e., injuries, fear, and PTSD). In addition, a recent systematic review showed that intimate partner homicides were greater among women than men, with 38.6% compare to 6.3% respectively [337].

In Italy, research on IPV is emerging with the second national survey on violence against women [168]. The survey involved 24761 women aged 16 to 70 years. Data revealed that 5.2% of all violent episodes were committed by a current partner and 18.9% by an ex-partner. In addition, current or previous partner are responsible for the most severe forms of violence, such as rape and physical violence (e.g., slaps, kicks, punches and bites).

Because men are significantly less victimized by IPV in terms of emotional problems and injuries, compared with women [61, 85, 91, 172, 353], in this dissertation the focus will be on male-to-female IPV.

Table 2.1: Types of Intimate Partner Violence

Physical violence	Physical violence includes the use of any act driven by the intention to use of physical force with the possibility of causing harm, injury, disability and the most severe potential consequence (i.e., death) [55]. It entails a wide range of behaviors such as scratching, shaking, pushing, grabbing, burning, choking, throwing objects, beating (e.g., slaps, bites, kicks, and punches), use of restraints, threat or use of firearms or edged weapon [55].
Sexual violence	Sexual violence is divided into four categories. 1. Intimate partner sexual abuse: *"the use of manipulative, psychologically abusive tactics to keep a partner in submissive positions of power; strategies include sexual degradation, non-contact unwanted sexual experiences, and reproductive and sexual control"* [23, p. 8]. 2. Physically forced sexual activity: *"the unwanted sexual experiences involving touch but not sexual penetration or having sexual body parts fondled or grabbed"* [23, p. 8] [48, p. 17]. 3. Intimate partner sexual coercion: *"the use of non-physical, controlling, degrading, and manipulative tactics to obtain, or attempt to obtain, unwanted oral, vaginal, or anal intercourse, including forced penetration and sex with objects"* [23, p. 8]. 4. Intimate partner sexual assault: *"the use of physical violence or the threat of physical violence to obtain, or attempt to obtain, unwanted oral, vaginal, or anal intercourse, including forced penetration and sex with objects. Also includes unwanted penetration when a victim/survivor is unable to consent or is "unaware", i.e. asleep or under the influence of drugs and alcohol"* [23, p. 8].

Psychological violence	Psychological violence includes many verbal and non-verbal acts with the intention to mentally or emotionally hurt the target of abuse, and/or to exercise control over her/him [55]. Hence, some psychologically violent behaviors may contain different types of expressive aggression such as humiliation, name-calling and etc., but also coercive control tactics (e.g., prevented from seeing or talking to family members, friends, etc.; limiting access to money, etc.) [55]. Psychological violence includes also threats to act physical or sexual violence; lack of rights of sexual or reproductive health; use of victim's and/or abuser's vulnerability; manipulation of information that makes the victim doubting about her/his knowledges [55].
Stalking	Stalking is a perpetrator's behavior characterized by repeated and unwanted attention and contact that provoke fear, apprehension, or alarm for victim's security or for other people close to her/him [55]. Stalking describes a range of behaviors that may include: • repeated and unwanted phone calls, emails, or text/instant messages, etc.; • leaving unwanted presents (e.g., flowers, letters, etc.) or weird or threatening things; • watching or following, spying, or appearing in places when it was unwanted; • enter in a furtive way into the victim's personal property, leaving signs of him/her presence; • damaging or threatening the victim's belongings; • threatening to physically harm the victim [55].

2.1.1   Risk Factors for Intimate Partner Violence: the Ecological Model

IPV is a complex and multi-dimensional problem, and over the years, many different theoretical models have been proposed to explain this complexity, describing several risk factors related to this issue [10, 195]. Moreover, due to methodological differences, data from different studies have shown a wide range of risk factors for IPV [3].

Some researchers have applied Bronfenbrenner's [57] Ecological theory of human development, to conceptualize the several risk factors of IPV (e.g., [76, 159]). In the Ecological systems theory of Bronfenbrenner [57], development is seen as a dynamic process, in which an individual's actions reflect the interaction between the individual factors and the social environment, intended as an ordered series of concentric structures: microsystem, mesosystem, exosystem, macro-system. Ecological theories of IPV classifies risk factors in four levels: individual, relationship, community and societal.

1. The individual level covers the biological and personal factors, such as age, gender, education and income, personal history, substance abuse, psychological problems, personality disorders, and aggressive inclinations, that can increase the likelihood of being a victim or a perpetrator of IPV [10, 195, 376].

2. The second level known as relationship encompasses the individual's proximal social network such as family (e.g., intimate partner, family members), friends, and workplace situations that may increase the risk of perpetuating or accepting IPV [10, 195, 376].

3. The third level refers to the community where social relationships are developed (e.g., schools, workplaces and neighborhoods) and investigates which factors could increase the likelihood of becoming to perpetrate or suffer of IPV [10, 195, 376].

4. The last level includes the societal factors, such as cultural, gender and societal norms, and health, social, educational and economic policies, affecting the rates of IPV [10, 195, 376].

Ecological theories of IPV supports the view of embedded levels of causality and it theorizes the causes of violence not as deterministic, but as probabilistic [158]. The ecological framework is one of the most broadly applied

for understanding IPV, using by the World Health Organization (WHO) too [10]. So far, researchers have more investigate the individual and relationship levels rather than the community and societal levels which may affect the likelihood of IPV [195, 376].

Individual Level Risk Factors Associated with IPV

Among individual risk factors related to IPV victimization, young age was significantly associated with being victims of IPV [3, 67, 364]. Moreover, lower-educated women [366], women with low income [364], and separated or divorced women [364, 366] were more likely to report being victims of IPV. Studies differ about whether, during pregnancy, the prevalence of IPV increases, decreases or is still the same [24], but it is clear shown that some women experience IPV during this period with also repeated and severe form of violence [60].

Exposure of child maltreatment such as growing up with intra-parental violence [3], and sexual abuse [98] were a strong predictor of being a victim of IPV.

In literature, while the majority studies focused on depression as potential outcomes of IPV (e.g., [47]), only a few studies highlighted that depression may be a risk of IPV or it was possible a reciprocal relationship between depression and IPV [183]. For instance, in longitudinal studies females adolescent with depressive symptoms were more at risk for physical partner violence [209] and sexual violence victimization [124]. Instead, González-Guarda and colleagues [134] tested the relation among resource availability, IPV, and depression by means of Vulnerable Population's Conceptual Framework [123]. The study showed that there was a bidirectional relationship between exposure to IPV and depressive symptomology: IPV may increase depression, and depression may influence the women's likelihood of experiencing IPV [134]. Iverson and colleagues [169] argued that depression symptoms such as feelings of guilt, or helplessness, may increase the risk for IPV compromising the capacity to recognize potential abusers, and to stop violent relationships.

Even if a causal relation between alcohol and the experiencing of IPV is unclear, some longitudinal studies showed an association between alcohol use and subsequent IPV [103]. The use of the drug has been less investigated as a risk factor [75]. However, a longitudinal study with a community sample of women points out that women who reported the use of hard drugs

were more likely to experience IPV within on ongoing relationship, while hard drugs and marijuana were predictors of IPV in new relationships [349]. Moreover, another longitudinal study with urban and low-income women receiving emergency care indicated that different types of substance use bring to different form of IPV: relative to non-heroin users, heroin-using women were more likely to report any subsequent IPV (e.g., physical, injurious, or sexual IPV) and to experience an injury from IPV; crack or cocaine use was predictor of injurious IPV and severe verbal abuse; hard drugs use was associated with all types of IPV [130].

The beliefs of women may affect their likelihood of being victims of IPV. In fact, women with attitudes that support the acceptance of beating a wife were more likely to experience IPV [3]. Moreover, women with a past history of victimization by intimate [92] or non-intimate partners [3] during adulthood were at higher risk of experiencing abuse by future partners compared to women without previous history of abuse. These results suggest the importance of increase the sense of control and empowerment of women victim of IPV [196].

Among individual risk factors related to IPV perpetration, low income [291], male unemployment [96], and younger men [67] were more likely to act IPV. Moreover, women victims of IPV were more likely to have a lower-educated partner compared to a higher-educated man [107].

As exposure of child maltreatment, the physical abuse, emotional abuse, sexual abuse and witnessing IPV were significant risk factors of male IPV perpetration [295].

In the past, several studies have investigated the relationship between the perpetration of IPV and antisocial personality disorder and its related features such as anger and hostility, highlighting as antisocial behavior is a risk factor for IPV [75]. For instance, two longitudinal studies showed that antisocial behavior was predictive of violence toward a female partner and was recognized as a mediator for earlier risk factors like poor parenting practices [72] and deviant peer association in adolescence [73]. Moreover, a meta-analytic review suggested that higher levels of anger and hostility differentiated between IPV perpetrators and nonviolent males, even after controlling relationship distress, and discriminated between moderate-severe IPV men and low-moderate IPV perpetrators [256].

With regard to the harmful use of alcohol, male problem drinking was associated with IPV against women [96,107], and her likelihood to be injured

[350]. Although in a recent review Capaldi and colleagues [75] showed a low association between IPV and alcohol, probably due to alcohol correlation with other IPV risk factors, Langenderfer [200], in her review, stressed that the alcohol is a "malleable" risk factor for some violent people and therefore if taken into account would reduce IPV perpetration rates. Also, substance use predicts IPV. For instance, Feingold, Kerr, and Capaldi [117] found that men consuming substances such as cannabis, hallucinogens, and nicotine were more likely to perpetrate IPV than men with no substance use.

Attitudes toward violence may influence the perpetration of IPV. Studies demonstrated that men who have more positive attitudes about violence and more traditional gender role ideologies were significantly more likely to report IPV perpetration [112, 309]. Moreover, experience dating aggression increased the likelihood to be violent in the adulthood relationships [260].

Relationship Level Risk Factors Associated with IPV

One factor of relationship level that has been examined in association with risk for IPV was marital dissatisfaction/discord. This factor was identified as a proximal predictor of IPV [75]. Moreover, a review highlighted that male offenders of IPV and female victims reported significantly lower relationship satisfaction and higher discord than female offenders and male victims had [336]. However, Marshall and colleagues [229] found that occurrence of men and women's IPV was predicted by couple conflict but the frequency of IPV was predicted by hostility for men's perpetration and by couple conflict for women's perpetration, pointing out the different nature of IPV between men (i.e., individualized nature) and women (i.e., dyadic nature). In addition, longer marital duration was a significant risk factor for male IPV perpetration and female IPV victimization [17].

As gender role theory suggested [262], men who support beliefs, attitude masculine gender expectations could involve in more gender role conflict and, consequentially, perpetrate more IPV if their partners violate these norms [198]. For example, educational disparity, in particular women with more education than their partners, may increase the likelihood of experience IPV [5].

As identified by Abramsky and colleagues [3], women with children from past relationships and women whose partners were unfaithful during their relationship suffered greater levels of IPV.

Community Level Risk Factors Associated with IPV

Recently, the role of community level variables has been an emerging focus in the literature for predictors of IPV [75]. Within community level variables, traditional gender roles were identified as important risk factor of IPV [2]. For instance, communities characterized by men's authority over women's behavior [160], low percentage of women with high level of education [160], and low women's autonomy [186] were at higher risk of IPV. Similarly, people living in communities with tolerant attitudes toward IPV were more likely to justify [170] and experience IPV [53, 187]. Another important neighborhood level factor was also low-literacy neighborhoods that increased the likelihood of IPV [5].

Neighborhood disadvantage (e.g., poverty, employment instability, etc.) may shape the risk of IPV. A longitudinal study with a nationally representative sample found a relationship between neighborhood disadvantage and IPV, even if after controlling for individual-level predictors of IPV [45]. Furthermore, IPV experiences among close social support group members had adverse consequences such as increasing of women's personal likelihood of experiencing IPV [287]. Hence, community violence may lead to an acceptance of violence, including IPV, that may increase the risk of IPV perpetration and victimization [287, 288]. Moreover, these environments could be characterized by low collective efficacy [308] reducing the willingness of community members to intervene in front of IPV and, consequently, increasing weak community sanctions against IPV [82, 287].

Societal Level Risk Factors Associated with IPV

Societal factors which may increase the likelihood of IPV are 1) factors that develop a tolerable climate for violence; 2) factors which sustain gaps or tensions between groups of people, and 3) factors that contribute to reducing inhibitions against violence [195]. For instance, cross-cultural studies showed that IPV occurs more in societies where women have more difficulties to divorce from their partners and where violence is usual in conflict circumstances [215]. As suggested by Jewkes [171], many cultures tolerate IPV because of *"the importance of maintenance of the male-female union at all costs, police trivializing reports of domestic strife, or lack of legislation to protect women"* (p. 1426). In conclusion, some social norms that collocate women in a role of subordination to men (e.g., gender inequality social
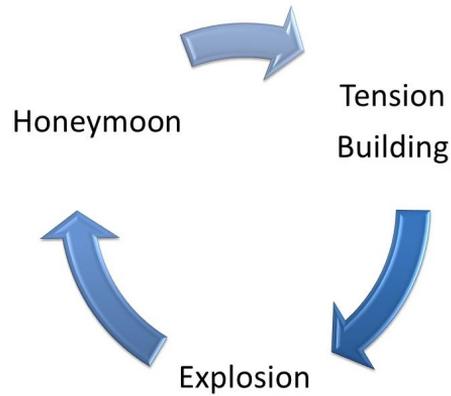
Figure 2.1: The Cycle of Violence. Source: Ref. [368].

norms) often legitimize male violence in some societies [304].

2.1.2   Dynamics of Intimate Partner Violence

In addition to the literature of IPV risk factors, some theories focused on the
dynamic patterns observed in IPV [63,176,179], such as the Cycle of Violence
theory [368], the Duluth model of Power and Control Wheel [272], and the
Family Systems theory [131]. These theories are characterized by different
dynamic patterns of IPV [63, 176, 179]. Moreover, the Cycle of Violence
theory and the Duluth model belong to the feminist perspective [10]. This
approach explains IPV as the results of the unequal distribution of gender
power in a patriarchal society [49], and men use violence to maintain their
privilege [10]. Hence, feminist perspective has been focused on a macro or
socio-political level of explaining [387]. The Family Systems theory, instead,
applied another perspective which has been focused on interpersonal process
[387] and violence is the outcome of the family system [340].

Cycle of Violence Theory

The cycle of violence is a three-phase process proposed in 1979 by Walker
[368], in order to describe patterns in a violent relationship [10]. In this model
(see Fig. 2.1), the abuse inflicted comes out and recurs in cycle, making it
usually predictable [10, 179].

The first phase is called "tension-building" during which the abuser starts to be hostile and critical of the woman, who alters her behavior to keep calm him. However, woman's attempts are more efficient at the beginning of this stage than toward its end, and eventually, when the efforts do not work anymore, the explosion happens [369].

During the second phase "explosion", the abuser starts to perpetrate IPV, that could implicate different types of violence such as physical, psychological, or sexual abuse [10]. This acute battering incident is the shortest phase but it may involve the most physical harm [369].

The second phase is followed by a "honeymoon" stage, where the abuser starts to apologize for his behavior, promising that violence never happens again, and he behaves in a loving, or contrite way towards the woman. For some couple, instead, the abuser only decreases or stops to be violent against the woman [10]. Both "loving contrition" and "no tension" times are successful behaviors that serve as the reinforce to keep the victim in the abusive relationship [369]. In fact, when the tension rebuilds, the cycle reoccurs again [179].

In this theory the concept of "learned helplessness" [317] has been applied in order to describe the psychological modifications in battered women that partially explains their not leaving a violent relationship [369]. In the classic controlled experiment of Seligman and Maier [316] with dogs in different types of cages, the authors demonstrated that dogs' experiences of repeated, not avoided, casual shock result in the acquisition of a feeling of helplessness in new situations where escape would be possible. Like the dogs with electrical shock, battered women who have experienced repeated cycles of violence may develop a feeling of helplessness to escape from the violent relationships and a set of cognitive coping skills (e.g., denial, minimization, and dissociation of the mind from the body) that help their likelihood of survival [369]. Anyway, when a battered woman perceives that those attempts will not able to protect her or her children, she may try to escape from the abusive relationship [369]. Moreover, Curnow [97] found a period within the cycle of violence, between phase two (explosion) and three (honeymoon), called Open Window Phase where help-seeking and reality behaviors of IPV victims were more likely to occur. In this phase battered women were more likely 1) to recognize themselves as a victim who is unable to stop the violence, 2) to seek for help, 3) to learn about alternatives to abuse and, 4) to be most receptive to intervention [97]. Thus, the Open Window Phase may

be perceived as an important opportunity to give support to a victim of IPV and help her to stop her cycle of violence [97].

Duluth Model: Power and Control Wheel

In 1984, the staff of Domestic Abuse Intervention Program (DAIP), with the collaboration of battered women, developed in the city of Duluth (Minnesota) the model of "the Power and Control Wheel" [272]. Power and control are usually recognized as the driving motivations under violent acts and the model documented the most common tactics that abusive men used against these women in order to preserve male power and control [10]. In the Duluth model, the main eight tactics used by a batterer are: coercion and threats; intimidation; isolation; minimizing, denying or blaming the violence; emotional abuse; economic violence; use of the children; and using male privilege [179]. The abuser uses these tactics intentionally to control the victim [10]. Moreover, physical and sexual violence may include all these violent behaviors and, in contrast to the cycle of violence, the abuse is not an isolated incident but a constant presence in IPV victims [10, 179].

Family Systems Theory

Through interviews with female victims of IPV, Giles-Sims [131] developed a six-stage model of abuse relationship (i.e., 1. the establishment of the family system. 2. the first incident of violence. 3. stabilization of the violence. 4. the choice point. 5. leaving the system. 6. resolution to more of the same) in order to understand IPV victims' decision to stay, leave and/or return to the abuser [129]. According to the Giles-Sims' systems model [131], at the beginning, each couple establishes the boundaries and rules of the patterns of interactions that are based on individual characteristics acquired in previous family systems that tend to resist to change. After the first episode of violence, it is possible that violence will be repeated or not, depending on positive or negative feedbacks of the internal system of both victim and aggressor [131]. Positive feedbacks (e.g., increased power or control, violence as a normal act within the marriage) may lead to more violence, establishing the violent patterns [131, 179]. Moreover, the violence is influenced by feedback from context (e.g., family members, friends, and law enforcement) [131, 179]. However, in the violent relationship may happen a specific violent episode that is not being tolerated, moving the victim to

the "choice point" [129]. The victim may choose to leave the system because she recognizes opportunities coming from other systems (e.g., support of friends and family, shelter services, legal protection) and if the victim receives positive feedbacks from a new system, the reorientation in this new system will be will be a possible prospect [129]. Anyway, at the end, the victim may also come back to the abuser and engage in the previous system where violence patterns are present, or in which there is the risk that violence will return; or the victim may leave definitively the relationship and reach a new system's patterns [129].

2.1.3 Complexity Science Approach and the Dynamics of Intimate Partner Violence

Recently, some researchers have proposed to apply three common dynamic patterns from complexity science (i.e., periodic, chaotic, and random dynamics) in order to understand the dynamic patterns of IPV [63, 176, 177, 179].

In this field, couples may be configured as a dynamic system in which members of the dyad have social interactions over time; these interactions are influenced by partner's behavior and proximal contextual factors [74, 176].

Before explaining these patterns it is useful to recall the concept of the attractor. Complexity science uses the concept of attractor to define repeating patterns [63], which can be visualized as *"magnets that exert a pull on the system"* [371, p. 633]. As shown in Fig. 2.2, there are four main types of attractor: fixed-point (i.e., attractor is a point), limit cycle (i.e., attractor is a closed curve), limit torus (i.e., in the periodic trajectory of the system, there can be more than one frequency across the state of a limit cycle), and strange attractor (i.e., attractor has a complex figure) [258]. Each attractor has a basin of attraction, which is the set of points that are driven towards a specific attractor, and each system may have more the one attractor [293]. In fixed-point, limit cycle, and limit torus, the initial close points continue close because they evolve following the same rules, while, in strange attractors, close points deviate over time [293]. Moreover, strange attractors are also aperiodic, and a system characterized by such attractor is unsteady state and does not rerun the same behavior pattern [293].

The periodic dynamic is characterized by a cyclic behavior of its system in which events result regular and predictable [176]. Thus, periodic systems have strong attractors (e.g., fixed-point, limit cycle, and limit torus) influencing behaviors, they are insensitive to small changes in their initial
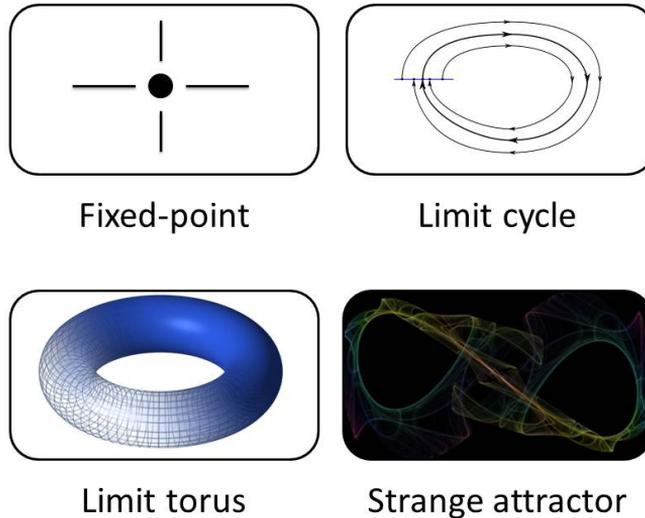
Figure 2.2: Types of Attractor: Fixed-Point, Limit Cycle, Limit Torus, Strange Attractor.

conditions, and they are also stable over time [176, 179]. In such systems actions and outcomes are tightly correlated and they react in a predictable way to actions: large interventions will produce big changes in behaviors' pattern while small change will produce a small impact [63].

The chaotic dynamic is characterized by a global behavior pattern that recurs but the evolution of its system is unpredictable [63, 176, 179]. In fact, chaotic systems have strange attractor shaping behaviors [293] but, unlike periodic systems, they are sensitivity to the initial condition, where small initial changes may result in disproportionately large outcomes, and they react in an unpredictable way to actions [179]. Chaotic dynamics is exemplified by the classic metaphor of "butterfly effect" [220], which refers to the idea that a butterfly's wings in Brazil (i.e., small change in the initial condition of the system) may produce a tornado in Texas.

Finally, the random dynamic (e.g., pink noise or criticality) results in *"a random pattern of responses of varying intensity"* [63, p. 6]. Its system is

characterized by no attractors influencing behaviors and, as a chaotic system, it is sensitivity to initial condition [245], making the system unpredictable in its behavior and in response to changes [176, 179].

Chaotic and random dynamics are generally 'non-linear' because the outcome of these systems is not proportional to the input and, consequently, unpredictable [176, 179]. Given this, a small intervention, in some variables, may have large, unexpected results whilst a large intervention do not necessarily have a large effect [293].

Recently, some authors recognized a similarity of behaviors among periodic, chaotic and random dynamics and some theories of IPV. The cycle of violence theory [368] appears to be consistent with the periodic pattern; the family systems theory [131] yield to a chaotic partner; and, finally, the Duluth model [272] lead to a random pattern [63, 176, 177, 179]. For instance, Burge and colleagues [63], by means of baseline surveys, end-of-study surveys, and daily assessments of IPV, showed that women within the periodic group reported high arguments and violence preceding violent days such as the tension-building phase of the cycle of violence theory, perceiving also the violence as predictable and controllable. Moreover, in a mixed-methods study, Katerndahl and colleagues [177] indicated that a woman within random dynamics, similarly to the Duluth model, has partner that use several controlling strategies, making the violence unpredictable and, finally, a woman within chaotic dynamics, likely of the family systems theory, gives high importance on their relationship, minimizing the partners' behavior.

In summary, empirical support of the three models (i.e., Cycle of Violence theory, Family Systems theory, and the Duluth model) was found in the literature [63, 176, 177, 179]. These three models of IPV dynamics were not mutually exclusive [63], and different patterns may change over time based on stressors, resources and social connectedness and support [177, 179]. In fact, violence within a couple is not just the product of the relationship, but external support and stress interact constantly with the couple system and they lead toward nonlinear dynamics, increasing the range of possible values of the system [176, 177]. Moreover, interventions or support persons may change the dynamic of the couple, increasing the victim's safety [63]. In conclusion, IPV is a complex issue, not explicable by a unique pattern model [179].

2.1.4   Intimate Partner Violence and Social Support

Social support has been identified as an important factor for the IPV dynamics. A couple is not isolated but it may have many relationships with different community members such as family, friends, and neighbors which are critical to maintain or mitigate the issue of partner violence [137, 227].

Social support is a complex construct used *"to describe help that is given and received from others in a difficult situation"* [270, p. 751]. As suggest by Southwick and colleagues [334], there are different aspects of social support construct:

- a. structural social support refers to the social integration which reflects not only the size of individual's social network but also frequency of social interactions [90, 249, 334];

- b. functional social support consists in the perception of the capacity of available social support to satisfy some needs, providing particular functions [90, 249, 334].

Moreover, the main functions of a social network are [334]:

- a. emotional social support which is exemplified by respecting, loving and caring behaviors, provided by sources of social support;

- b. instrumental/material social support that is characterized by the provision of services, financial assistance, material goods (e.g., giving a place to stay, providing child care, etc.);

- c. informational/cognitive social support is described as the provision of advice or guidance intended to help individuals solve the problem.

In the field of IPV, social support can be provided by informal support members (e.g., family, friends, or neighbors) or formal support members and services (e.g., police officers, social services, law enforcement, or shelters).

A recent review highlighted that the IPV victims are more likely to disclose their abuse to a member of informal support [344], especially female friends and female family members that are recognized as a source of social support [113, 299]. However, situational variables, such as features of violence (e.g., type, frequency, and severity) and the presence of a witness, influence the disclosure [344].

When a victim of IPV discloses to a member of her informal network, the latter may react in a positive and helpful way. Among the main positive and helpful interventions, literature indicates emotional support [354], informational/cognitive social support [51], and tangible/instrumental support [354]. Moreover, Beeble and colleagues [40] showed that individuals who had personally known a victim of IPV report to give emotional support as the most frequent form of support provided, followed by formal support, and, instrumental support. The latter was proved more by people who had experienced more forms of abuse. Additionally, females, younger individuals, people with more attitudes toward the importance of appropriate responses about IPV from the criminal justice system, witnesses of violence in childhood, individuals personally experience IPV, and people with a perceived perception of IPV in their community were more likely to help a victim of IPV [40].

However, the reactions and actions of the members of the social networks of an abused woman could be also negative and unhelpful [344]. For instance, a recent study showed that the impact of IPV on subsequent depression is significantly higher for women who lived in neighborhoods with high proportions of friends and relatives [383]. Among the possible explanations, the authors have mentioned the possibility that, in the context of IPV, some neighborhood ties such as family or relatives may condone the use of violence within relationships [383]. Additional negative or unhelpful social reactions are: blaming for the abuse, minimizing, and/or distancing of the informal network members from the situation [354].

Given that it is possible that victims of IPV experience both positive and negative reactions from the members of their informal support system [354], social support has a complex role in abused women' well-being, and it may work through different theoretical models (e.g., main effects model, moderator or buffer model, and mediator model) [39]. Regarding the effects of informal social support on abused women' mental health and physical safety, studies showed that abused women with greater informal social support report better mental health [41] and less suicide attempts [236]. Moreover, women with less social support are more likely to be IPV victims [361]. For instance, a recent study, aimed to analyze the size, structure, and composition of the social networks of abused women, showed that the social networks of IPV victims are smaller, with more females but fewer in-laws, offer less support (e.g., fewer reciprocated bonds), and have IPV victims with a higher

centralities than social networks of non-abused women [178]. In addition, women with a history of IPV are more likely to be re-abuse if they have less social support [66, 136].

Social support may also be a protective factor for IPV perpetration [75] For instance, a study with an Air Force sample of men and women showed bivariate correlations among some aspect of support (e.g., spouse deployment support and support from neighbors) and lower perpetration of IPV [326].

As hypothesized by Katerndahl and colleagues [178], on the one hand, social support may reduce the likelihood of being a victim of IPV, but on the other hand, it may allow women victims of IPV to stay in abusive relationships by decreasing IPV impact on their mental health.

2.1.5   Bystander Approach as a Community Strategy to Prevent Intimate Partner Violence

As introduced previously (see section 2.1.4), IPV victims are more likely to report victimization to a member of informal support that may react in a negative and unhelpful way [344]. Additionally, episodes of IPV are not entirely private, and they can occur in front of a third party or bystander [151, 279]. Bystanders are individuals or groups of individuals who are witnesses of an act such as violent behavior; they may decide to do nothing, support the perpetrator, or help the victim [29, 151]. While traditional interventions of preventing IPV have been focused on victims and abusers, more recently programs have begun to explore the role of bystanders in reducing gendered violence [54]. Indeed, when community members support the respect of women, by intervening across IPV situations, they may reduce the violent behavior of some men [338]. Additionally, given the potential for bystanders to decrease the rate of IPV, bystander approaches started to become more and more prevalent components of sexual and IPV prevention programs [79], in order to develop *"models of community levels of change"* [33, p. 62].

In general, this approach gives to community members *"a role to play in ending violence by promoting collective efficacy and a sense of responsibility combined with skills for stepping into help others and to change social norms"* [29, p. 1]. In college settings, bystander prevention programs have the goal to increase the evaluation skills of students about IPV, by giving information regarding the continuum of IPV and its warning signs, in order to empower them to intervene in an appropriate and safe way [54]. As suggest by McMahon and Banyard [233] about the prevention of sexual assault, bystanders

may act before the assault (i.e., primary prevention), during an assault (i.e., secondary prevention), and after an assault (i.e., tertiary prevention). Moreover, intervention responses of a bystander may be direct, addressed to the victim and/or the aggressor (e.g., talking with the victim or perpetrator, physically confronting the abuser, etc.), or indirect (e.g., calling the police, etc.) which can be of helpful or not [83, 84].

Branch and colleagues [54] showed that if college students were witnesses of IPV incident committed or suffered by a friend, they would be more likely to stop it directly rather than indirectly (i.e., report it to the police or campus officials). Moreover, regarding the potential reactions of college students to disclosure of IPV among their friends, the same study indicated that the majority would encourage a friend to get help or end the relationship [54]. However, a minority of college students would just listen to or think that a friend would ask for help for IPV victimization, highlighting that students should be trained about how to do after a disclose victimization [54]. From the victims' perspective, a recent study found that bystanders of peer- and caregiver-perpetrated victimization help more than harm and their support may have an impact on victims' mental health [151]. However, the study also showed that bystanders do something ineffective or they do nothing, underlying that potential bystanders maybe do not know how to help and support [151].

Theoretical Framework and Factors Influencing Bystander Behavior

One of the main social-psychological models for understanding bystander behavior is Latané and Darley's [202] five-step bystander intervention model. This model describes a series of five stages that lead to an individual's decision to intervene or not when someone needs help: first an individual needs to notice the situation; second she/he must interpret the situation as a problem; third an individual needs to assume personal responsibility to intervene; fourth she/he decides how to provide help; and fifth an individual chooses to take action.

Support for some steps of bystander intervention has been applied across a variety of emergency situations, including sexual assault and IPV (e.g., [64, 100]). However, Banyard's [27] review on the use of the ecological model [58] in the prevention of sexual violence states that Latané and Darley's [202] is focused only on to the individual and his/her immediate context while the

application of an ecological model gives a more comprehensive framework to bystander behavior.

1. Individual factors.   A number of several individual factors may impact bystander intervention such as cognitions, personal beliefs and attitudes, emotions, gender, costs and benefits and self-efficacy [27].

Individuals are more inclined to help in situations of IPV that are perceived as severe (i.e., where the risk of injury to the victim is greater) [84] and problematic [100]. Additionally, literature demonstrated that when an ambiguous episode happens, a bystander will seek social cues and he/she will be influenced by others' reactions [201]. Indeed, in a recent study [253] college students stated that they are more willing to report to a formal social support member (e.g., police or campus authorities) a physical assault, followed by a theft, and a sexual assault. The author pointed out that the sexual assault vignette was ambiguous about the injury and it may make less clear its possible severity, and she also hypothesized that maybe college students do not perceive sexual assault as serious or uncommon problem [253].

As suggested by Banyard and Moynihan [30], community-level social norms and personal attitudes toward sexual and IPV are important correlates of bystander behavior. Stronger antiviolence attitudes (e.g., low rape myth acceptance; low perceptions of victim worthiness) was associated with more likelihood of helping, acquiring a higher sense of responsibility [64, 232].

Personality variables such as anger seem to be associated with direct physical intervention [83] and more aggressive people choose less helpful behavior regardless of the severity of the IPV situation [84]. Moreover, individuals who know someone that was a victim or had experienced family violence (e.g., witness IPV as a child or experienced child abuse) have more likelihood to intervene as a bystander [40, 84, 232]. About the relationship between bystander behavior and experience of psychological, physical, sexual victimization or perpetration, a recent study showed that sexual and physical victimization and physical perpetration may increase the likelihood of bystander behaviors, especially among females [380].

Some studies investigated the decision-making process of a bystander, analyzing of the perceived costs to intervention [33]. For instance, one study about bystander intervention to prevent sexual assault [64] showed that barriers are related to a decreasing of intervention. Also in the case of IPV, a study found that greater intervention likelihood is predicted by participants'

perception of lower barriers to intervention [83].

Self-efficacy is another important variable. Indeed, participants with higher bystander self-efficacy are more willing to intervene in IPV episodes [206]. Moreover, higher knowledge of the problem of sexual violence increases prosocial bystander behaviors [26]. For instance, Banyard and Moynihan's study [30] found that while awareness of the problem is significant for specific incidents of sexual violence and IPV, self-efficacy is significant for more general and ambiguous incidents. Moreover, the study highlighted that higher bystander intent is associated with higher awareness of the problem, lower rape myth acceptance, higher bystander efficacy, lower score on peer norms supporting coercion in relationships [30].

Finally, among individual-level variables, gender has a key role for explaining bystander behavior [27]. For example, Banyard [26] and McMahon [232] found that females not only report less rape myth acceptance, but also more levels of bystander behaviors. Katz and colleagues [180] did not find gender differences in bystander intent to help but they found gender differences in the perception of victim blame (i.e., more in male participants) and empathic concern (i.e., more in female participants). Chabot and colleagues [84] found that in a hypothetical more severe IPV scenario there is not gender difference about bystander intervention but males and females differ in the less severe IPV case with men more likely to be involved in risky behavior (e.g., get physically involved, or talk directly to the aggressor) than females. In a more recent study, Chabot and colleagues [83] supposed that women are less likely to engage in risky behavior as bystander because they are more likely to perceived more personal safe barriers (e.g., get hurt, or need help from other individuals to be effective) than men. However, a qualitative study with male participants involved in anti-violence against women works reported that the intervention in front of man's violence behavior or speech is complex and challenging [79]. With regard to the indirect bystander behavior, women are more likely to report crime than men, especially the suspect sexual assault, maybe because females identify with the survivor or for the safe nature of the intervention [253].

2. Relationship factors. Bystanders are usually individuals that victims know [151]. The majority of the studies that investigated the relationship between victims and bystanders are in the field of sexual violence/assault. Katz and colleagues [180] found that bystanders are more likely to help a poten-

tial victim who is a friend than a stranger, assuming that bystanders' feeling more responsible, and more empathic concern to help a friend. Bennett and Banyard [44] showed that having a friend relationship with a potential victim increases the perception of the situation as safer and as more problematic for intervening. This study also investigated the relationship between a perpetrator and a bystander, and it found that having a close relationship with the offender decreases the interpretation of the episode as a problem but it also increases the perception of the history as safer [44]. Additionally, the study revealed that knowing both a victim and a perpetrator is associated with an interpretation of the episode as safer, and less problematic compared to knowing just one individual [44]. Burn [64] found knowing a potential victim or an aggressor increases the likelihood to intervene as a bystander but females are more likely to help a victim who is a friend while males have more likelihood to help a perpetrator who is a friend. A recent study [267] investigated the relations among nature of the crime (e.g., IPV or sexual assault), relation distance (e.g., know aggressor or victim, or know neither), form of intervention (e.g., direct, indirect and delegation), and sex of the bystander. The study showed that bystander behavior may be influenced by the relation distance and type of the crime. For both IPV and sexual assault, a direct action was correlated with knowing victim or offender while a delegation was related to knowing neither [267]. Moreover, males had a higher likelihood to direct interventions while females were more likely to indirect interventions [267]. The study also found different bystander interventions for IPV and sexual assault. In the case of IPV, bystanders were more likely to indirectly intervene while in the case of sexual assault, bystanders had a greater likelihood to directly intervene [267].

Some studies investigated the influence of group processes in bystander intervention. In the classic work of Latané and Darley [202], the authors reported that witnesses of an emergency situation are less likely to intervene if they are with other individuals compared to alone. Latané and Nida's [203] review proposed three social psychological processes that might explain the social inhibition of helping: diffusion of responsibility, audience inhibition, and social influence. In the diffusion of responsibility, a psychological cost associated with nonintervention are shared with other individuals present, and the responsibility of intervention decreases while the likelihood of nonintervention increases [203]. In the audience inhibition, the presence of other individuals may inhibit the bystander intervention because of the embarrass-

ment if the situation is misinterpreted and the fearful if his/her behavior is negatively evaluated by others [203]. In social influence, a bystander may see the other individuals' behavior, and, consequently, he/she may inhibit his/her action based on the inaction of others [203].

However, as pointed out by Latané and Nida [203], there are some circumstances under which the social inhibition of helping may be reduced or removed. Levine and colleagues [213] highlighted the importance *"of exploring the social category relations between all those present in the emergency situation"* (p. 1453). In the context of violence, based on self-categorization theory [355], which assumes that individuals may categorize the self at different abstraction levels (e.g., "I", "We", etc.) that brings to a depersonalization of one's specific features, Levine and colleagues [213] found that bystanders are influenced by in-group members, and they are more likely to intervene if the victims is an in-group member. More recently, Levine and Crowther [214] investigated the relations among bystander behavior, group size, and social categorization. The research showed that under some circumstances increasing group size may inhibit or encourage bystander intervention [214]. For instance, when a bystander is with friends but not with strangers, a greater group size increases the likelihood of intervention [214]. Moreover, the study demonstrated a relation between group size and social category that increases bystander intervention only when a bystander is with in-group members and the victim is an in-group member [214]. Finally, when a bystander is with in-group members and gender is salient, sex role stereotypes of heroic norms [214] may influence the bystander intervention with males that are more likely to intervene with increasing out-group size while the female are not.

Social norms such as peer norms may also influence the bystander intent to help and the bystander behaviors in the case of sexual and IPV [27]. For instance, Brown and Messman-Moore [59] showed that male college students have a lower likelihood of being willing to help if they perceived higher peer norms supporting sexual assault. Additionally, Banyard and Moynihan [30] found mixed results regarding peer norms supportive of sexual coercion, bystander intention to help, and bystander behavior: participants who have higher peer norm supportive of sexual violence reported lower level of intention to help but also higher number of bystander behavior, highlighting the need to better understand these complexity findings.

3. Community and societal factors. So far, few studies have investigated these levels of influence [27]. One factor that may play an important role is the sense of community [27]. For instance, Banyard [26] found that greater perceived of sense of community is associated with different positive bystander outcomes (e.g., decisional balance, self-efficacy, intent to help, and actual bystander behavior), and it is also a predictor of intent to help in bystander behavior. Concerning societal factors, Banyard's [27] review highlighted the importance of conducting cross-cultural studies in order to obtain *"clues about how macrosystems may impact bystander intervention"* (p. 223).

Evaluation of Bystander Approach

In literature, different bystander programs are present, and they have been evaluated [338].

"Bringing in the Bystander" is a bystander program that supports the idea that IPV takes place as a continuum from less violent behavior to more aggressive acts and, consequently, it gives information about how safely act, by training the participants of their intervention skills and by providing knowledge of community resources [338]. For example, Moynihan and colleagues [246] found that, after five weeks attending "Bringing in the Bystander" program, sorority women participants pointed out improved bystander efficacy, intention to help, and sense of responsibility for stopping violence than the control group. Moreover, Banyard and colleagues [32] showed that after two months attending the programs, both female and male college students in the two program groups increased the bystander attitudes, efficacy, and behaviors compared to the control group.

There is also a social media campaign, the "Know Your Power", based on "Bringing in the Bystander" that consists in the presence of posters that reproduced scenarios within campus context that would legitimate bystander intervention [338]. The results of studies that assessed this bystander prevention program demonstrated promising changes in the awareness and in the willingness to intervene as a prosocial bystander [282, 283].

A recent evaluation study [247] showed that, after controlling for initial score of bystander behavior, participants who attended to the "Bringing in the Bystander" plus the "Know Your Power" reported greater bystander behaviors related to helping friends 12 months post program compared with control group (i.e., only "Know Your Power"), although both intervention

and control groups showed a diminish in behavior over time. Moreover, this study also evaluated how individual differences influence the prevention program effectiveness [247]. Participants with a higher level of awareness of sexual and relationship violence showed more effectiveness and influence of the program [247]. Opportunity in the last 2 months to engage in bystander behaviors was a moderator for helping a friend and who had a lower past opportunity to behave as bystander showed more helping behavior toward strangers [247]. Finally, gender impacted the behavior only for the program group, by highlighting the need for knowledge about gender differences responses of prevention programs [247].

To prevent sexual violence by means of an online bystander intervention program, Kleinsasser and colleagues [185] developed and assessed "Take Care". This program aimed to increase students' efficacy about bystander behavior, by showing that taking "some" actions may modify the risk situation and prevent violence toward a friend [185]. Evaluation of "Take Care" program, both at the post-intervention and at the 2-mounth follow-up, demonstrated that program group compared to control group showed greater efficacy for engaging in bystander actions [185]. Moreover, at the 2-mounth follow-up, participants of program group reported more bystander behaviors compared to those of control group [185]. Finally, the efficacy for intervening was able to predict bystander behaviors at the follow-up and it partially mediated the Take Care's effects on bystander behaviors to protect friends [185]. In conclusion, these results highlighted that bystander intervention program may be effectively developed by means of online settings [185].

2.2 Social Psychology and Agent-Based Modeling

2.2.1 Agent-Based Modeling: Precursors and Features

Agent-Based Modeling (ABM) *"is a modeling and computational framework for simulating dynamic processes that involve autonomous agents"* [224, p. 6]. The ABM approach consists in modeling a social system by means of "simplified individuals" that follow simple probabilistic rules. The main purpose is that of trying to explain the appearance of complex collective phenomena as emergent features of interacting systems. ABM models are rarely susceptible of a theoretical investigation and are generally studied by com-

puters. Thus, ABM may be implemented using various software packages and toolkits, including Java, C++, Swarm, Repast, NetLogo, MATLAB, and others [156, 224].

ABM is not a new approach to model the dynamics of complex systems [223]. Indeed, ABM dates back to the 40s, with the introduction of the notion of "cellular automata" (CA) by Von Neumann and Ulam [252], which may be seen as a simple precursor of ABM [378]. One the most popular model of CA was Conway's Game of Life [157]. Researchers highlighted that despite CA system are relatively simply, they are able to produce emergent behavior [157, 378].

The concept of artificial intelligence is also very important in the development of the idea of ABM [329].

Finally, another significant precursor of ABM is the "complex adaptive systems" (CAS) approach [157, 329]. CAS are constituted by a large number of adaptive agents that interact with each other in a nonlinear manner, producing, through bottom-up mechanisms, emergent phenomena that are more than the sum of the individual parts [223].

In general, ABM may be composed of three main elements: agents; agents' relationships and interactions; and agents' environment [223].

Although there is not a unique definition of agent, it consists of essential and useful characteristics [222, 223]. More specifically, an agent is characterized by a boundary with distinguishable features and rules (i.e., self-contained); it usually moves in an environment where the agent may interact with others (i.e., situated). Each agent has a state that varies over time and an agent with more states is characterized by more behaviors (i.e., state). An agent has its objectives (i.e., goal-directed), and it may behave independently compare to other agents and its environment (i.e., autonomous). Additionally, each agent has rules for interaction with other agents and the dynamic interactions may influence its behavior (i.e., social) [222, 223]. In the interaction with other agents, one agent may behave after the action of others (i.e., asynchronous), or it may act at each discrete time step (i.e., synchronous) [80]. The population may be homogeneous, with all identical agents, or heterogeneous. Sometimes an agent is also able to adapt, modifying its rules based on its experience and memory (i.e., flexible) [222, 223].

Concerning agents' relationships and interactions, one agent knows only local information without any central controller [223, 329]. Additionally, it is possible to establish the connectedness or topology of ABM (i.e., how agents

are connected to each other) [223]. Finally, agents' environment provides more or less information to its agents, also influencing their behaviors [223].

To conclude, as suggested by Macal and North *"one of the motivations for agent-based modeling is its ability to capture emergence"* [224, p. 11], resulting from a micro-level interaction among agents.

2.2.2 Agent-Based Modeling as an Alternative Approach in Social Psychology

ABM has been used in different domains such as economics, social science, and biology in order to understand complex interactions and dynamics of a system [156]. However, as argued by Smith and Conrey [329], ABM should have more application as theory building tool in the field of social psychology.

Social psychology was defined as *"the scientific study of the effects of social and cognitive processes on the way individuals perceive, influence and relate to the others"* [330, p. 3]. In particular, some social phenomena (e.g., bystander intervention, interpersonal/intergroup conflict, etc.) are the overall outcome of dynamic and interactive processes among individuals over time and they are not the result of an action of single individual [328, 329]. Smith and Conrey stated that *"ABM approach is better able than prevailing approaches to capture the types of complex, dynamic, and interactive processes that are so important in the social world"* [329, p. 87].

However, in social psychology, the dominant approach to create a theory or to do a data-analytic is the variable-based modeling (VBM), such as the causal modeling approach, in which the emphasis is on variables and the identification of constant covariation between variables [329]. In contrast, ABM is based on generative approach and focused on interactions among agents that may produce emergent phenomena [251, 329].

Smith and Conrey pointed out that ABM and VBM approaches have other differences which can be interpreted as "complementarity" because these differences are related to the specific purposes of each approach [329].

Causal modeling seems more appropriate for researchers that want to have knowledge about the relations among variables within a dataset, even if usually there are the assumption of causal unidirectional causality and the difficulty in integrating non-linear effects [329].

ABM, instead, with its attention to micro, macro and aggregate levels, is very appropriate for studies that want to describe the emergent behavior by dynamically interactive processes [251, 329]. In particular, ABM bypasses

assumptions of rationality and consents multiple causal directions and non-linear effects [329]. However, ABM is less suitable for the numerical predictions or for a data-analytic approach [329].

To summarize, one of the main advantages of the ABM use is that it allows linking theoretical levels (e.g., intrapersonal, interpersonal, group and intergroup processes), giving new understanding into their implications and allowing cross-disciplinary integration [329].

Recently, some studies have exploited the ABM approach in order to explain some social psychological models [109, 327].

Smaldino and colleagues [327] introduced an ABM to better understand the Optimal distinctiveness theory (ODT) [56, 211], in which individuals prefer minority groups because they perceive them as "optimal" for their required balance of inclusion and distinctiveness. In the simulations, if an agent was not characterized by the most optimal social identity in its social environment, it could choose a new identity which was the nearest to the optimal one. The authors proposed two models: a well-mixed one where agents live in an unstructured population and they have full knowledge of other agents' social identities; and a spatial model, where agents live in close neighbors and they base their choices on their social identities. Results showed that optimizing one' distinctiveness is very dependent on local information. In fact, in well-mixed population agents had lower distinctiveness levels compared to the agents of the local neighborhood, making the first agents "unhappy".

Some researcher used ABM to understand some couple processes such as marriage formation and marital dissolution (e.g., [248, 307]), while others utilized cellular automaton models to analyze human aggression, highlighting that if in a neighborhood some agents exhibit aggressive behavior, other agents may engage in aggressive behavior too because it may be more adaptive [181].

Recently, Drigo and colleagues [109] tried to simulate the help-seeking behavior of women victims of IPV by means of ABM. They proposed a stochastic model with two types of agents: individual humans and shelters. Through NetLogo tools, they created a geographical space (i.e., the city of Chicago) with shelters and married or cohabiting Hispanic, non-Hispanic White and African American women.

In their model, Drigo and colleagues [109] supposed that victims of IPV tried to stop the violence increasing their economic independence or leav-

ing the abusive relationship. They proposed several woman's reactions to IPV such as going to a shelter or community center, calling the police, disclosing the violence to friends, leaving the relationship, coming back to the relationship, and starting to be homeless. The authors employed ABM to determine, among married or cohabiting Hispanic, non-Hispanic White and African American women, the effectiveness of the number of shelter beds, public awareness and cultural sensitivity of service providers on IPV prevalence.

The results of the simulations showed that not always the access to shelters, public awareness, and cultural sensitivity of service provides a decrease in the rates of IPV. The impact of these parameters may depend on the location of the shelters and the demographic status of women. The authors stated that ABM model is *"a novel method of representing and understanding the dynamics of IPV, and can be used as a tool for testing the implications of various policy alternatives"* [109, p. 250].

2.3 Stochastic Systems

Agent-based systems are in general defined by means of a set of probabilities, that give the behavior of individuals: how they move, how they change state, how they establish relations with other. In summary, they are stochastic systems composed by many pieces (extended stochastic systems). However, in the literature about dynamic psychological modeling (as cited before), the language of a low-dimensional dynamical system is preferred. One can speak of attractors, basins, cycles, etc.

In this section, we shall try to clarify the relationship between extended stochastic systems and dynamical systems.

Extended stochastic systems, in other words agent systems, are composed by an ensemble of interacting individuals $\boldsymbol{s} = \{s_1, s_2, \ldots, s_n\}$. Each individual i may assume a number of states ($s_i = 0, 1, 2, 3, ..., n$). Given a specific interaction network, each individual will change its status, in a probabilistic way, based on its present state and the states of the other individuals in its neighborhood. We can represent the interaction network by means of an adjacency matrix $A_{ij} = 1$ is j is interacting with i and zero otherwise. It is also possible to introduce weighted interactions by allowing A_{ij} to assume continuous values. The neighborhood of a given agent i at time t can be
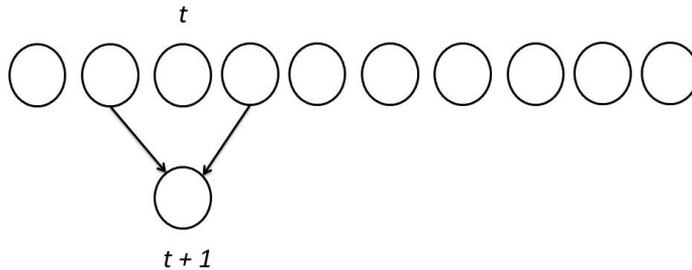
Figure 2.3: Interaction Rules.

represented as a vector

$$\boldsymbol{N}_i(t) = \{A_{ij}s_j(t)\}_{A_{ij}>0}\,.$$

Formally, the evolution of an individual state is given by

$$s_i(t+1) = f\left(s_i(t), \boldsymbol{N}_i(t)\right).$$

The application of the previous formula may be synchronous for all agent or sequential.

The function f is generally implemented as a table of probability transition $\tau(s'|s, \boldsymbol{N})$, which gives the probability that the next state of the agent is s' if its present one is s and that of the neighborhood is $\boldsymbol{N}$.

$$s' = \begin{cases} s^{(a)} & \text{with probability } \tau(s^{(a)}|s, \boldsymbol{N}) \\ s^{(b)} & \text{with probability } \tau(s^{(b)}|s, \boldsymbol{N}) \\ \dots \end{cases}$$

Clearly, $\sum_j \tau(s'|s^{(j)}, \boldsymbol{N}) = 1$.

For instance, to better understand the transition matrix process, we introduce a simple infection model consisting of two discrete states $s_i = 0, 1$. State $s = 0$ represents a healthy individual while the state $s = 1$ describes the condition of the disease. We suppose to have ten individuals and everyone may interact with its two neighbors (see Fig. 2.3).

The chance to assume the new state, given the old state of the individual and the status of the two individuals connected $\tau(c'|c, \boldsymbol{N}) = \tau(c'|c, \ell, r)$, where c is the state of the agent under examination, c' is its future state,

and ℓ, r are the state of the left and right neighbors. Since all these states are Boolean, the evolution rule is defined by $2^3 = 8$ possibilities. For instance, these can be

$$\tau(1|0,0,0) = 0;$$
$$\tau(1|0,0,1) = \tau(1|0,1,0) = \tau(1|1,0,0) = p_1$$
$$\tau(1|0,1,1) = \tau(1|1,1,0) = \tau(1|1,0,1) = p_2$$
$$\tau(1|1,1,1) = 1$$

where the probability of being infected is p_1 if either the agent is already infected or so are one of neighbors, p_2 if two among the site itself or neighbors are infected, and one if all of them are infected. Clearly $\tau(0|c,\ell,r) = 1 - \tau(1|c,\ell,r)$. This model has been already studied (as a model of opinion formation) in Ref. [20].

The model of our example exhibits two absorbing states: the state $\{0,0,0\dots\}$ and the state $\{1,1,1,\dots\}$.

Each individual will follow a stochastic trajectory (e.g., $s_i(t) = \{0,0,1,0\}$. This example trajectory says that the individual is healthy for the first two steps, then got ill and finally recovers in the last step. Generally, we are not interested in the description of a single trajectory, but in the average behavior of the population. To achieve this goal we can resort to two approaches. The first one consists in averaging over many simulations, the second one in trying to obtain the evolution equation of the probability distribution $P(\boldsymbol{s}, t)$ of the entire configuration, which obeys the Markov equation

$$P(\boldsymbol{s'}, t+1) = \sum_{s_1, s_2, \dots, s_n = 0}^{1} P(\boldsymbol{s}, t) \prod_{i=1}^{n} \tau(s_i'|s_i, \boldsymbol{N}_i(t)).$$

The simplest approximation is that of assuming that the are no spatial correlations among agents, or that they are "stirred" at each time step. This is called a "mean field approximation". By calling $x = x(t)$ the probability of having an infected individual at time t

$$x = \frac{1}{n} \sum_{i=1}^{n} s_i(t),$$

and $x' = x(t+1)$ that of finding an infected individual at time $t+1$, we have

$$x' = \sum_{c',c,\ell,r=0}^{1} x^{c+\ell+r}(1-x)^{3-c-\ell-r}\tau(c'|c,\ell,r).$$
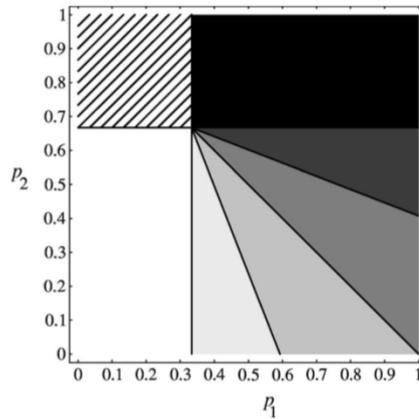
Figure 2.4: The Mean-Field Phase Diagram of the Infection Model. Healthy (zeros) individuals in white, ill (one) in black (Source: Ref. [20]).

After some algebra, we find

$$x' = 3x(1-x)^2 p_1 + 3x^2(1-x) + x^3.$$

This equation has three fixed points, $x = 0$ (the first absorbing state), $x = 1$ (the second absorbing state) and

$$x = \frac{3p_1 - 1}{1 + 3p_1 - 3p_2},$$

which represents an "active" phase with a mixture of healthy and ill individuals.

The stability analysis of the three asymptotic states is condensed in Fig. 2.4. For large values of p_1, one can observe a smooth transition from all-healthy to mixed and to all-ill states, while for small values of p_1 there is a coexistence of all-healthy and all-ill states with a sort of the first-order transition depending on the initial state.

The actual simulation shown in Fig. 2.5 are quite similar to the mean-field ones. Notice that in this case, the first-order transition appears as a sharp line dividing the two phases, and its precise location depends on the initial state.

Notice also that the effects of reshuffling ("stirring") individuals can be
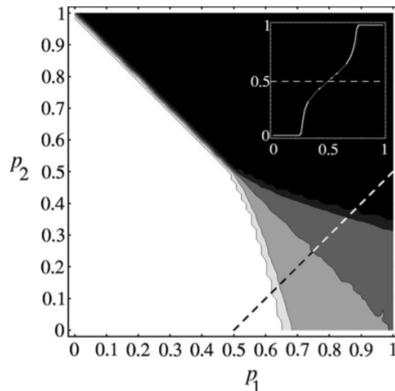
Figure 2.5: The Simulation Phase Diagram of the Infection Model (Source: Ref. [20]).

obtained also in a regular lattice by adding a small number of long-range interactions, due to the the so-called "small world effect" [372].

By means of the mean-field approach, it is thus possible to "translate" a stochastic system into a dynamical one. The phase of transitions in stochastic systems corresponds to bifurcations in dynamical systems. For instance, a quite famous stochastic system is the Ising model [167], which was introduced as a model of magnetic materials, but can equally well be adapted to modeling social systems [21, 22]. In this model, each "spin" can assume two values, or two opinions, -1 and 1. Each spin interacts with neighboring ones (according to a network of interactions that may take the form of a regular lattice, or random connection, or small-world, etc.). Each individual has a character (conformist or contrarian) given by a parameter J that may be positive or negative, respectively. A conformist tends to align with neighbors, a contrarian to disagree.

In the simplest version, all individuals have the same conformist character (i.e., they are "ferromagnetic spins") and the model, in a two-dimensional lattices or with random connections, presents a phase transition similar to the Curie transition of magnetic systems: for low enough coupling (corresponding to large temperatures) the system is disordered and the average magnetization (average opinion) is zero, while for large coupling one a nonzero average opinion (positive or negative) emerges. This scenario is very
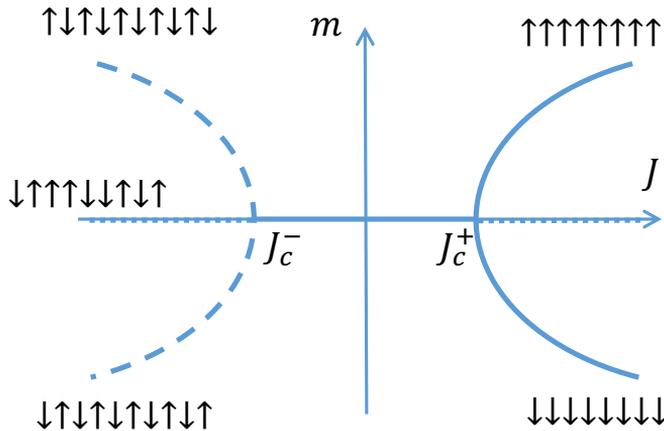
Figure 2.6: A schematic view of the Ising Model Phase Diagram, showing the magnetization m as a function of the coupling J (rescaled by temperature). For $J_c^- < J < J_c^+$ the only stable state is the disordered one, corresponding to zero magnetization. For $J > J_c^+$ there are two partially ordered stable states, with nonzero magnetization. For $J < J_c^-$ and sequential dynamics, there are two partially ordered stable states corresponding to an alternation of "up" and "down" states. In the case of parallel dynamics, for $J < J_c^-$ the equivalent of a limit cycle appears, with oscillating magnetization.

reminiscent of a pitchfork bifurcation, where, upon changing parameters, a stable state (zero magnetization) becomes unstable, and separates the basins of new stable fixed points.

One can have also other types of attractors. If all people take the decision at the same moment (a parallel Ising model), and the individuals exhibit a contrarian attitude, for large coupling the system begins to oscillate, at least locally: every "hipster" sees that others have assumed the same opinion as he/she and therefore changes his/her mind, but all other do the same (see Fig. 2.6).

Finally, it is possible also to have more complex behavior. If we add "social norms" to contrarians we have "reasonable contrarians" (hipsters, indeed) which tend to disagree with marginal majorities, but do not dare
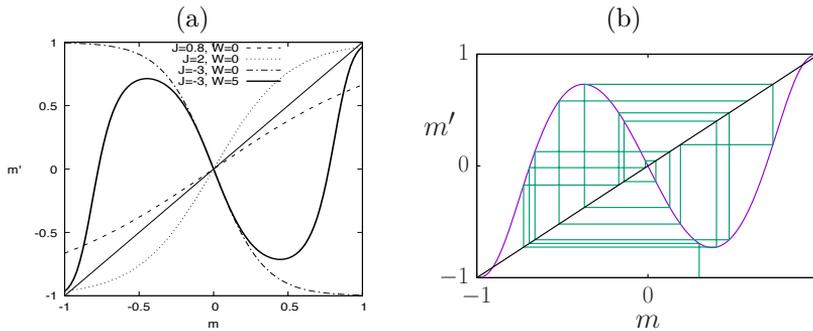
Figure 2.7: (a) The Mean-Field Map of the Ising Model with linear (J) and nonlinear (W) interactions. For $W = 0$ the possible attractors are fixed points at $m^* = 0$ for $J < J_c = 1$ and $\pm m^* \neq 0$, for $J > J_c$. For $J < 0$ and $W = 0$ only the attractor $m^* = 0$ is present. (b) When $J < 0$ and $W > 0$ limit cycles and chaotic attractors can appear.

break social norms and do not take opinions in opposition to a strong majority (see Fig. 2.7), as also showed experimentally by Asch [14, 15].

In this case, in the mean-field approximation, one can have a rich bifurcation scenario with period-doubling and pitchfork bifurcations, ending in chaos [see Fig. 2.8 (a)]. What is remarkable is that, if the agents are randomly connected or if long-range connections are sufficiently common (small world effect) also the stochastic microscopic system behaves in a very similar way [see Fig. 2.8 (b)].

So, concluding, there is indeed the possibility of interpreting microscopic stochastic models as if they were described by low-dimensional deterministic equations, and also to approximate the collective behavior of a microscopic model by means of a mean-field description, but this is not granted in every situation: if the individual dynamics is highly non-linear and especially when the system is not homogeneous it is impossible to adopt a simple description in terms of few macroscopic dynamics.
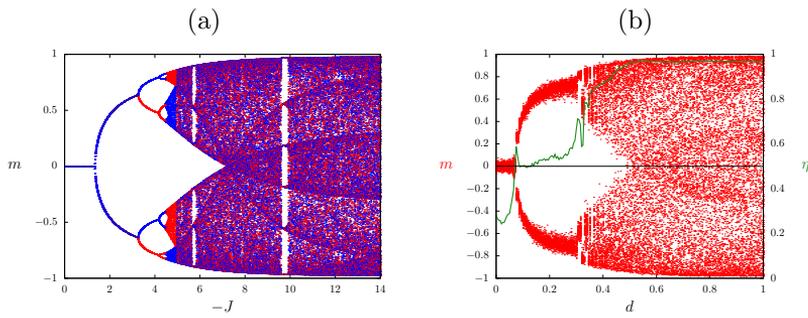
Figure 2.8: Bifurcation Diagrams. (a) The Mean-Field Bifurcation Diagram for the Ising Model with $J < 0$ and $W = 15$. (b) The equivalent Bifurcation Diagram for the Agent-based simulations with 10000 agents randomly connected.

Chapter 3

Preliminary Studies about Behaviors in Online Environments

In this chapter, we present three contributions about preliminary studies that aimed to describe how people behave in online environments. The first study sought to investigate the self-presentation in online social networks, developing a metric to detect an excessive online self-presentation; the second study, instead, was intended to detect the emotional contagion between Facebook users. The results of these studies confirm that linguistic analysis can be a useful tool for analyzing the psychological dynamics within virtual environments. The third study aimed to identify indicators of online groups interacting via chat. This study seems to support the hypothesis that even in virtual environments are functioning social scripts behind of the interaction

between individuals. [1] [2] [3]

3.1   Introduction

Internet, World Wide Web and the related information and communication technologies have reconfigured the access to information, services, and other individuals, speeding the fruition.

Researchers have recognized that the increasing use of Internet use offer new opportunities for their work [289]. Already in 2004, Gosling and colleagues [138] suggested the use Internet as a new method of research in the field of psychology. Although Internet data can show some criticalities, the authors demonstrated some advantages of this method over the traditional as increased anonymity, larger sample sizes and more heterogeneous and motivated participants [138].

More recently, Ramsey and colleagues [289] investigated the quality of Internet research (e.g., web-based questionnaire administration and crowd-sourcing) showing that item recognition accuracy, higher for women than men, did not differ compared to traditional methods and they supported the use of web-based research in the psychological field.

With regard to intimate partner violence (IPV) issue, a recent qualitative study indicated that women with a history of IPV and drug use feel easier and safer to report their problem to a website or other online tools than a face to face interview [87]. Moreover, another study, involving gay and bisexual men talking about IPV, found that online focus groups giving anonymity and confidentiality allow more openly and fully discussions of sensitive topics [381].

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[1]The first preliminary study presented in this chapter has a similar published version as Guazzini, A., Cecchini, C., Guidi, E., Milani, M., & Meringolo, P. (2016). "Excessive Self-Presentation on Facebook. One Year of Analysis of Online Posting". *Frontiers in Psychological and Behavioral Science*, 5(1), 16-27. [144].

[2]The second preliminary study presented in this chapter has a similar electronic preprint version as Guazzini, A., Guidi, E., Cecchini, C., Milani, M., Vilone, D., & Meringolo, P. (2016). "Self-presentation and emotional contagion on Facebook: new experimental measures of profiles' emotional coherence". *arXiv preprint arXiv:1607.07243*. [145].

[3]The third preliminary study presented in this chapter has been published as Guazzini, A., Cecchini, C., & Guidi, E. (2016). "Small Group Processes on Computer Supported Collaborative Learning". In *International Conference on Internet Science (pp. 123-132). Springer International Publishing.* [143].

Based on this background, this chapter is composed of three preliminary
studies aiming to fill some key gaps in current research and clarify the ways
in which people behave in online environments such as online social networks,
virtual chats, ect.

These preliminary studies were implemented during the first year of doc-
torate. Overall these studies, even though they do not directly focus on the
issue of IPV, have indirectly contributed to the methodological approach by
providing insights on how individuals behave in virtual environments.

3.1.1   Aim of Preliminary Studies

The main goal of the first preliminary study entitled "Excessive Self-
Presentation on Facebook. One Year of Analysis of Online Posting" was
to develop a new metric that would be able to assess an excessive self-
presentation on online Social Networks by analyzing the content of posts
published on 50 users' Facebook profiles for one year.

The second preliminary study "Self-presentation and emotional conta-
gion on Facebook: new experimental measures of profiles' emotional co-
herence" sought to detect the emotional contagion among Facebook users
through a measurement of the degree of agreement between the posts and
their comments by means of the content analysis of posts published on 50
users' Facebook profiles for one year.

The third preliminary study "Small Group Processes on Computer Sup-
ported Collaborative Learning" tried to understand which psychological
mechanisms affect collaborative inhibition and facilitation in virtual envi-
ronments, starting with a simple task of memory recall.

Below the full texts of the contributions about the three preliminary
studies are reported.

3.2   First study: Excessive Self-Presentation on Facebook. One Year of Analysis of Online Posting

Abstract- Facebook and social networks in general have exploded in popu-
larity in the last several years, becoming a social institution for teenagers,
who use it for self-presentation and as a fundamental tool to project their

personal identity and manage social relationships. Taking the opportunity to reveal psychological features by analyzing personal profiles, this study examined the relationship between linguistic style, self-presentation, and other activities on Facebook over the course of one year. Through the linguistic analysis of 50 adolescents' profiles, a new model titled "The Excessive Online Self-Presentation Model" was developed by considering only the contents of their public posts. Results showed how excessive self-presentation consisted of disclosing personal information, and with a higher number of words per post. Moreover, it was discovered that the frequent use of sexual language was associated with attention-seeking behaviors. The findings of this study were in line with prior research on the content differences in online self-presentation, confirming how linguistic analysis can be a useful tool to analyze cognitive dynamics within virtual environments, and providing a new assessment model to reveal fundamental psychological characteristics of adolescent online behavior.

3.2.1   Introduction

A. Self-Presentation on Social Networks and Adolescent Users

Social network sites (SNSs) are web tools that allow the self-presentation of users on public or private personal internet pages and facilitate interaction among users of the same social network [52].

The opportunity to share personal content in a mass communication highlights the implementation of specific self-presentational strategies in the presence of multiple audiences [52, 192].

Self-presentation, according to Goffman's theory of identity and social performance, is a process of impression management [133]. Recently, Kim, et al. defined online self-presentation as a strategy for people to manage and introduce themselves to a virtual community [182]. Some studies suggest that self-expression and impression management are the most relevant reasons people create personal profiles [193, 237]. SNSs allow users to control their personal webpages for self-presentation by updating profile information, and posting photos and messages [62, 339].

Recent literature has repeatedly focused on online self-presentation, and a number of studies have highlighted the fact that people tend to disclose more personal information on SNSs compared to other means of communication [88]. Researchers began investigating the origins of excessive online

self-presentation, wondering whether frequent posting might be a sign of
narcissism [46, 77, 102, 300].

As suggested by Kosinski, Stillwell, and Graepel [189], personality traits
are identifiable from digital records of human behavior [189]. Researchers
studying narcissism have generally emphasized a positive relation with social
networks usage; studies have found that the narcissistic trait is related to an
excessive amount of activity on Facebook, including connecting to a large
number of friends and frequently publishing posts and photos [264, 377].
Furthermore, narcissistic people spend at least one hour a day on Facebook
and use more self-promoting photos than other users [237].

Interestingly, there are sex-related differences in self-presenting behav-
iors, such as the fact that men appear to disclose more basic, impersonal
information (i.e., sports) and more contact information than females on Face-
book [216]. Moreover, it appears that men and women use SNSs for different
reasons; women seem to self-present with more personal photos than males,
while men publish more brand-related posts [86, 150, 197, 318, 352]. There are
conflicting beliefs regarding gender-specific narcissism on social networks.
Some studies suggest males are more narcissistic and post more personal
photos on Facebook [46, 77, 163, 333]. On the contrary, other research shows
females tend to be more narcissistic by using Facebook more frequently and
displaying more self-promoting photos [62, 237, 250].

In a short period of time, Facebook has become the most popular SNS,
especially among adolescents, with an average of over 936 million daily users
in March 2015 [99, 116, 173]. Thus, the proliferation of SNSs has distinctly
changed communication between people, the expression of emotions, the
broadcast of information, and "socio-cultural revolution" mainly concerning
adolescents, who were born in an "open cyber-world" [191, 264, 296]. With
the ability to share information on personal pages and self-present, SNSs
allow people to build an online social identity, which is crucial in adolescence
[62, 193].

Previous research has demonstrated that adolescents use Facebook for
identity building and expansion [173, 219]. Also, they appreciate the ability
to share basic information and connect with people. In another study on
teenage online habits, Madden, et al. reported that boys and girls post
similar content, but boys tend to share their own phone number on SNSs
and have more public profiles than girls [225].

Despite these interesting data, few studies have investigated the self-

presentational style on SNSs in adolescents [264]. Because this demographic frequently uses Facebook and is more likely to publish posts with the purpose of building their identity, the concern is that SNSs may reinforce, or even create, narcissistic tendencies [62]. Furthermore, excessive online self-presentation might be misused, as in the context of cyberbullying, or have a negative effect on a user's reputation, future education, and job opportunities [359, 360].

B. Self-Presentation and Language Use on Facebook

Researchers have frequently analyzed linguistic style and use of words to better understand human psychology [162, 238]. For example, some studies have shown that agreeable people use less swear words and negative emotion words, while extroverts use more personal pronouns, females low in conscientiousness use more second person pronouns, and finally those high in conscientiousness use less swear words [162, 238].

Literature shows that specific word categories can disclose a surprising amount of information about people and their behavior. Studies on text analysis suggest that function words (i.e., pronouns, prepositions, articles, and auxiliary verbs) appear to underline an attentional focus [274, 275]. Particularly, the use of first-person singular pronouns suggests a focus on one's self, while second- and third-person pronouns indicate social engagement or awareness [294]. Another study revealed that function words such as first-person singular pronouns, short words, and conditional, present tense verbs, and articles can reflect psychological intimacy and an engagement in social interactions [81]. Since the analysis of post content is relevant to understanding the connection between activity on SNSs and self-presentation style, recent research has investigated the relationship between peculiarities in linguistic style and self-presentation on SNSs [38, 268].

In an analysis of self-presentation management, Bazarova, et al. found differences in the expression of negative emotions in status updates compared to wall posts or private messages [38]. It seems positive emotion words are correlated with self-presentational concerns in status updates, which suggests a specific strategy in sharing positive emotions through public communication. In another study that focused on linguistic styles on Facebook and its relation to gender [313], females appear to use more emotional words (e.g., 'excited'), first-person singular pronouns, and psychological and social processes (e.g., 'love you'), while males tend to use more swear words, and

object references (e.g., 'xbox'). Additional research has focused on linguistic
markers of narcissism on SNSs. For example, DeWall, et al. investigated
how narcissists spread information about themselves on social media [104].
Across two studies, narcissistic individuals who did not use first-person sin-
gular pronouns, and assumed implicit markers of narcissistic self-focus, com-
pensated by publishing provocative online photos or using more profanity
and verbal aggression in their self-presentation. Another study revealed an
association between narcissism and the use of angry words, swear words, and
sexual language [163].

Since previous research has provided little information on the relationship
between linguistic style and frequency, and typology of activity on Facebook,
this study approached the theme of online self-presentation using the Lin-
guistic Inquiry and Word Count (LIWC) text analysis program to explore
the correlation between narcissism and Facebook habits [273].

C. Aims

The purpose of this study was to analyze the self-presentation styles of 50
Italian adolescents on Facebook. Thus, a new model titled "The Excessive
Online Self-Presentation Model" was defined to directly assess this tendency
through the linguistic analysis of public contents of personal pages.

In particular, this study intended to accomplish the following:

1. Verify the relationship between linguistic style, self-presentation, and
activity on Facebook.

2. Provide an operative framework to formalize, compare, and merge
existing narcissistic models.

3. Determine which LIWC dimensions could be used to evaluate excessive
online self-presentation and possible underlying gender differences.

4. Define a more effective model to automatically assess excessive online
self-presentation using only public linguistic dimensions.

Within these contexts, the following specific hypotheses were considered:

H1: Adolescents who publish more wall posts have a higher level of ac-
tivity on Facebook and receive a higher number of likes and comments.

H2: Different linguistic styles affect the kind of published posts on Face-
book and the number of likes and comments received.

H3: Excessive self-presentation is associated with a higher level of activity
on Facebook and a higher number of likes and comments received.

H4: Excessive self-presentation is related to the publishing of longer posts and the expression of negative emotions and sexual language.

H5: Excessive self-presentation reveals no gender differences but shows different linguistic styles between males and females.

3.2.2   Methods

A. Participants

Fifty adolescents (50% female, 50% male; Aged M=16.95, SD=1.08) participated in this study. All participants had an active Facebook account. The subjects were recruited from a Tuscan high school, and were involved in the "ARCA Project" patronized by a Tuscan municipality. Participants were recruited by means of a convenience sampling given that it seems to be one of the most suitable procedures and commonly used in this type of investigation [4].

The agreement of the school to participate was obtained from the head of the Institute. Teachers and a researcher explained the aim of the survey and confidentiality issues to the students. Parental and adolescent consent was obtained. The participants consisted only of Italian mother tongue citizens in order to conduct an accurate linguistic analysis. All subjects were involved as volunteers and could withdraw from the research at any time. To be included in the study, each participant had to meet the following requirements:

- Between 14-19 years old (i.e., age range of Italian high school students);

- Owned a Facebook profile for at least one year.

Hence, the exclusion criteria were as follow: students outside the specified age range, and having a recent Facebook profile, which could suggest an inexperienced Facebook user. A total of 50 students were contacted for the study, and all decided to participate for an entire year of data collection.

B. Design and Procedure

To analyze the Facebook usage on the participants' pages, a Facebook account was created with a research logo as the profile picture. When a participant's profile was located, a message was sent inviting him/her to participate in the study, and he/she was befriended. Participants were advised that the

researchers would have access to their Facebook pages, and the data would
be stored anonymously.

Data collection took place over a period of one year. Socio-demographic
features of the participants were collected by taking only those provided on
their public Facebook profile (i.e., hometown, current city, contact informa-
tion, relationship status, friends, followed people, visited places), following a
recent study that explored some of those variables [225].

Each Facebook profile was coded by means of an observation grid, which
was structured using objective criteria regarding the activity on Facebook,
extracting from each profile the dimensions of interest (i.e., complete activity,
wall posts, profile picture edits, personal photos, photos, videos, quotes, likes,
activities with likes, comments, wall post length, wall post average length).
The grid aimed to increase the reliability and validity of the data mining by
making the procedures more precise and reproducible. Moreover, the tool
allowed a more effective and immediate comparison between different data
collectors, as well as a robust way to allow for their synchronization and
operative standardization.

One year of the participants' activities on Facebook were analyzed, with
a total of $32,368$ activities ($28,878$ were wall posts) and $62,083$ comments.

C. Data Analysis

A preliminary description of each sample was carried out by adopting stan-
dard descriptive statistics, and producing the psychometric variables for all
the dimensions taken into consideration.

The inferential data analysis procedure began with the assessment of the
preconditions required by the statistics adopted, assessing in particular the
minimum sample size, balance of sub-samples, and their normality distribu-
tion parameters. In order to evaluate the differences between the sub-samples
defined by the operative factors of the study, the student's t-test statistics
were adopted. Next, the Pearson r linear correlation coefficient was used to
evaluate the degree of association regarding the continuous variables. And
finally, a linear regression analysis was employed to estimate the best model
fitting the experimental data.

1. Linguistic Inquiry Word Count computer-program (LIWC): Consistent
   with the need to study the linguistic use and self-presentation on SNSs,
   the linguistic content of the Facebook profiles was analyzed by apply-
   ing the widely used Linguistic Inquiry Word Count computer-program

(LIWC) [38, 128, 273]. All the profiles were considered separate elements, and the linguistic analysis concerned the entire production (i.e., the posts) as a single narration. The LIWC software analyzed transcripts on a word-by-word basis and compared words with a dictionary divided into 80 linguistic dimensions, including affective terms, cognitive terms, and social and communicative processes. For a complete overview, refer to literature [348].

2. Defining criteria for the convergent validity of the new model ("The Excessive Online Self-Presentation Model"): Following the link between excessive online self-presentation and narcissism, six models from literature describing narcissistic features on Facebook were taken into account [46, 62, 102, 104, 163, 268, 300].

Each model was developed by mapping the dimensions inferred from the empirical models on the Facebook activity variables and LIWC dimensions considered in this study.

The Buffardi model was defined with the following dimensions: wall posts, comments, personal information, quotes, profile picture edits, and personal photos [62].

The Bergman model presented the following variables: friends, photos, places visited, wall posts, profile picture edit, personal photos, and photos with other people [46].

The Carpenter model selected the following variables: wall posts, personal photos, profile picture edits, followed people, anger words, and swear words [77].

The DeWall model presented the following dimensions: first-person singular pronouns, reflexive pronouns, first-person singular verbs, anger and swear words, and personal photos [104].

The Holtzman model revealed the following variables: wall posts, wall post length, comments, friends, friends' words, anger words, school words, sexual words, and swear words [163].

Finally, the Panek model presented the following variables: complete activity, wall posts, and profile picture edits [268].

All the final model scores were computed as the sum of the zeta-scores of each variable composing them. The resulting distribution reported an average of 0, and a peculiar standard deviation. The averages of the six models were acceptably distributed in a Gaussian way, showing different standard deviations that suggested their different sensitivity.

Since these six literature models were not designed as exhaustive models,
it was decided to integrate them by creating an index (i.e., Centroid Model),
which was defined as the average of the six models under scrutiny. In this
way, a more precise and wider index was obtained to assess narcissism as
a continuous trait [71]. The score of the Centroid Model was assumed as
the "external" parameter estimating the subjects' excessive self-presentation,
and was used as external criterion to build and validate the new model on
excessive online self-presentation, and the well-defined relationship between
this behavior and narcissism [46, 77, 102, 300].

The Centroid Model reported satisfactory parameters of normality for
inferential analysis.

To construct the new model, first the correlations between each literature
model and all the LIWC categories were calculated, except for those already
contained in the models [46,62,77,104,163,268]. Then, all the LIWC variables
that did not correlate with any model were discarded, and a list of LIWC
categories characterized by a total computed score was obtained as follows:
each LIWC variable received one point for each model significantly correlated
and one point if the LIWC variable already belonged to literature models,
except for those containing such a LIWC variable. After this process, only
four variables (i.e., Comma, Physical, Sexual, and Word Count) reached the
maximum score (6), while only 23 variables out of 80 dimensions proposed
by LIWC appeared to have a score above 3. All the possible combinations
of the selected variables were considered as potential models and compared
by means of linear regression analysis.

3.2.3   Results

A. Descriptive Statistics of the Facebook Profiles Personal Information and Facebook Activities

Concerning the variables of the Facebook profiles, the participants disclosed a
large amount of personal information. Particularly, only 16% of participants
did not include a birth place, and only 12% did not declare their current
city. Regarding contact information, only 14% of participants showed their
mobile phone number, 10% their home address, 54% their Facebook email,
and 8% their personal email address. With regard to relationship status,
48% of the participants reported being single, while the others specified they
were in a relationship. The average number of Facebook friends was 3085.87

$(SD = 1089.118$; range $642 - 4970)$, and 64% of participants reported an average high number of places they had been ($M = 64.03$; range $1 - 644$). Moreover, 62% of participants indicated how many people they followed ($M = 11.87$; range $1 - 46$).

In reference to H1, a relationship between variables regarding the Facebook activity of the participating adolescents was investigated. Descriptive statistics and correlations are presented in Table 3.1.

Indeed, publishing more wall posts was strongly related to a higher overall activity level on Facebook, and was also related to a higher number of published photos and videos. Moreover, adolescents who published more wall posts also received more likes and comments on their activities. Since the Facebook variables presented many correlations, these variables were checked for when testing the aims.

As H2 focused on the relationship between linguistic analysis and the variety of activity on Facebook, Tables 3.2 and 3.3 show such results. The relationship between the Facebook activity variables and the LIWC categories was investigated using the Pearson correlation coefficient. Several significant associations are shown in Tables 3.2 and 3.3.

Table 3.2 shows that the Facebook profiles whose wall posts presented higher word counts and more commas had a higher number of wall posts, particularly longer wall posts and more quotes, and published more activities with likes, which received both likes and comments. The participants, whose wall posts showed more pronouns, particularly first-person singular pronouns, published more personal photos and quotes, received more likes, presented more activities with likes, and had longer wall posts. As main results, Table 3.3 shows the participants who spoke more about physical, body, and sex, and negative emotions presented a higher complete activity, particularly more and longer wall posts, more personal photos, quotes, and activities with likes. The participants who spoke more about friends exhibited longer wall posts and received more likes. Ultimately, speaking more about anger and sadness was related to receiving more likes and presenting more quotes.

B. Excessive Online Self-Presentation and Its Features about Facebook Activities and LIWC Categories

To verify H3 and H4 regarding the excessive online self-presentation's features, a correlation analysis between Facebook activity variables, LIWC cat-

Table 3.1: DESCRIPTIVE STATISTICS AND CORRELATIONS OF FACEBOOK ACTIVITIES.

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1- Complete Activity	-											
2- Wall Posts	0.99**	-										
3- Profile	0.48**	0.46**	-									
4- Picture Edit	0.56**	0.54**	0.71**	-								
5- Personal Photos	0.80**	0.74**	0.47**	0.71**	-							
6- Photos	0.67**	0.66**	0.24	0.17	0.35*	-						
7- Videos	0.66**	0.67**	0.39**	0.44**	0.35*	0.62**	-					
8- Quotes	0.49**	0.53**	0.38**	0.55**	0.24	0.22	0.53**	-				
9- Likes	0.99**	0.99**	0.48**	0.57**	0.79**	0.68**	0.66**	0.50**	-			
10- Activities with Likes	0.66**	0.69**	0.41**	0.57**	0.51**	0.26	0.40**	0.75**	0.66**	-		
11- Comments Wall	0.88**	0.91**	0.37**	0.47**	0.62**	0.54**	0.65**	0.64**	0.89**	0.77**	-	
12- Posts Length Wall Posts / Average Length	-0.05	0.02	-0.17	-0.08	-0.13	-0.14	0.10	0.13	-0.04	0.15	0.29*	-
Mean	647.36	577.56	22.76	48.68	217.72	62.12	94.04	12646.00	640.60	1241.66	46813.84	80.99
Standard Deviation	528.64	490.71	19.72	43.30	193.97	93.12	99.38	13279.67	520.43	926.41	42021.33	29.51
Skewness	1.84	1.92	1.11	1.27	2.23	3.87	1.21	2.03	1.81	1.61	1.68	1.30
Kurtosis	3.64	3.97	0.63	2.18	5.65	17.84	0.28	5.06	3.42	2.83	2.68	2.78

Correlations smaller than ±0.27 were not significant. Correlations with * were significant at $p < 0.05$. Correlations with ** were significant at $p < 0.01$. The percentage variables presented a mean and standard deviation because they were computed for each subject separately.

Table 3.2: CORRELATIONS BETWEEN FACEBOOK ACTIVITY VARIABLES AND LIWC LINGUISTIC CATEGORIES.

LIWC Linguistic Categories	Facebook Activity Variables											
	1	2	3	4	5	6	7	8	9	10	11	12
Word Count	0.89**	0.92**	0.37**	0.48**	0.62**	0.56**	0.65**	0.64**	0.89**	0.76**	0.99**	0.29*
Dictionary	0.25	0.27	0.20	0.33*	0.09	0.05	0.41**	0.34*	0.25	0.12	0.31*	0.22
Personal Pronoun	0.23	0.25	0.19	.42**	0.12	0.10	0.38**	0.35*	0.23	0.12	0.24	0.07
1st Person Singular	0.33*	0.33*	0.05	0.38**	0.25	0.25	0.32*	0.32*	0.33*	0.24	0.32*	0.12
Reflexive Pronoun	0.28*	0.29*	0.01	0.35*	0.14	0.25	0.42**	0.32*	0.28*	0.17	0.27	0.05
2nd Person Singular	0.12	0.12	0.28*	0.44**	0.10	0.10	0.47**	0.27	0.12	0.06	0.10	0.06
Negation	0.21	0.24	0.12	0.23	0.02	0.15	0.45**	0.30*	0.21	0.10	0.27	0.27
Article	0.22	0.24	0.20	0.21	0.08	0.13	0.33*	0.17	0.22	0.15	0.27	0.15
Preposition	0.21	0.22	0.19	0.12	0.02	0.11	0.36**	0.17	0.21	0.10	0.27	0.08
Verb 1st Pers. Singular	0.27	0.28*	0.05	0.33*	0.24	0.16	0.30*	0.31*	0.27	0.20	0.26	0.12
Conditional	0.13	0.15	0.08	0.19	0.02	-0.02	0.36**	0.22	0.13	0.10	0.19	0.16
1Present	0.17	0.19	0.13	0.31*	0.08	0.01	0.27	0.31*	0.17	0.09	0.22	0.24
Comma	0.41**	0.44**	0.20	0.47**	0.27	0.24	0.55**	0.53**	0.42**	0.42**	0.52**	0.27

Correlations smaller than ±0.27 were not significant; Correlations with * were significant at $p < 0.05$; Correlations with ** were significant at $p < 0.01$. These seventeen Facebook variables are the same as those displayed in Table 3.1.

Table 3.3: CORRELATIONS BETWEEN FACEBOOK ACTIVITY VARIABLES AND LIWC PSYCHOLOGICAL CATEGORIES.

	Facebook Activity Variables											
	1	2	3	4	5	6	7	8	9	10	11	12
LIWC Psychological Categories												
Physical	0.40**	0.39**	0.16	0.43**	0.35*	0.17	0.41**	0.23	0.40**	0.26	0.39**	0.31*
Body	0.34*	0.33*	0.12	0.26	0.27	0.20	0.44**	0.15	0.34*	0.16	0.35*	0.25
Sexual	0.30*	0.31*	0.13	0.42**	0.25	0.07	0.27	0.26	0.30*	0.27	0.33*	0.16
Negative Emotions	0.31*	0.32*	0.17	0.28*	0.16	0.10	0.45**	0.32*	0.30*	0.16	0.31*	0.01
Anger	0.26	0.26	-0.02	0.13	0.13	0.13	0.23	0.28*	0.26	0.21	0.25	-0.18
Anxiety	0.17	0.18	0.30*	0.24	0.11	-0.03	0.43**	0.16	0.17	0.01	0.13	0.01
Sadness	0.22	0.24	0.19	0.27	0.09	0.06	0.36**	0.29*	0.22	0.10	0.25	0.12
Friends	0.19	0.25	-0.02	0.12	0.03	0.19	0.09	0.32*	0.20	0.25	0.37**	0.54**
Tentative	0.11	0.12	0.04	0.17	0.06	-0.10	0.24	0.10	0.11	0.05	0.21	0.54**
Certainty	0.19	0.21	0.15	0.27	0.09	0.08	0.40**	0.24	0.19	0.13	0.28	0.41**
Inhibition	0.20	0.18	0.33*	0.28*	0.15	0.11	0.51**	0.09	0.20	-0.03	0.17	0.05
Exclusive	0.20	0.21	0.11	0.30*	0.07	0.03	0.41**	0.29*	0.20	0.11	0.27	0.27
Discrepancy	0.20	0.20	0.10	0.32*	0.15	-0.04	0.21	0.28*	0.20	0.10	0.19	0.02

Correlations smaller than ±0.27 were not significant; Correlations with * were significant at $p < 0.05$; Correlations with ** were significant at $p < 0.01$. These seventeen Facebook variables are the same as those displayed in Table 3.1.

egories, and the Centroid Model was conducted. The results are shown in Table 3.4.

Adolescents showing a higher tendency toward excessive self-presentation appeared to exhibit a higher level of activity on Facebook, had more friends, published more posts, particularly longer posts, had more activities receiving likes, and posted more photos. Consequently, they received more likes and comments. Regarding the correlations between the Centroid Model and the LIWC categories, the linguistic category indicated in general that excessive online self-presentation involved more structured, longer, and richer posts (i.e., higher word count and vocabulary, more commas, pronouns, articles, prepositions, and less numerals). Particularly, a higher number of first-person singular pronouns and first-person pronouns verbs was revealed. The affective category suggested that the prevalent emotions were usually negative.

The cognitive processes presented in excessive online self-presentation profiles were linked to concepts of discrimination (i.e. exclusive), and, at the same time, frequent usage of verbal immediacy (i.e., discrepancy, certainty) was shown. Finally, the biological category showed how the physical, sexual, and body words were used more often in excessive online self-presentation.

C. New Model: a Development and a First Implementation

To refine a new model to reveal the participants' excessive online self-presentation using only publically accessible posts, the observables derived by the LIWC analysis were investigated as a potential criterion. Only four LIWC variables (i.e., word count, sexual, commas, and physically-related words) were found to be significantly correlated with all of the six literature models taken into account. Such criteria were considered as potential parameters of the new model, and compared by means of standard regression analysis.

Linear regression analysis was adopted to refine the proposed model (F = 61, $p < 0.01$), which considered two variables including word count and sexuality, explaining 71% of the variance of the data (Table 3.5).

The relations among the six models, the Centroid Model, and the proposed model were verified using the Pearson correlation coefficient (Table 3.6), and the resulting matrix was characterized by highly positive correlations. The proposed model reported a strong correlation with the Centroid Model ($r = 0.83, p < 0.01$), confirming its convergent validity with the in-

Table 3.4: CORRELATIONS BETWEEN CENTROID MODEL AND FACEBOOK AND LIWC SCORES.

Activity on Facebook	Pearson Coefficient		LIWC-Linguistic Process Variable	Pearson Coefficient
Wall Posts	0.84**		Word Count	0.81**
Activities with Likes	0.84**		Comma	0.56**
Complete Activity	0.83**		Personal Pronouns	0.50**
Personal Photos	0.79**		Dictionary Words	0.50**
Wall Posts Length	0.79**		1st Pers. Pronouns Singular	0.48**
Comments	0.72**		If	0.46**
Likes	0.70**		Present Tense	0.42**
Quotes	0.67**		Verb First Person Singular	0.39**
Photos	0.66**		Numerals	-0.37**
Profile Picture Edit	0.65**		Articles	0.36**
			Negations	0.35*
			Prepositions	0.33*
			2nd Pers. Pronouns Singular	0.32*

Facebook Profile Variable	Pearson Coefficient		LIWC-Cognitive Processes	Pearson Coefficient
Map	0.52**		Discrepancy	0.41**
Videos	0.47**		Exclusive	0.39**
Friends	0.34*		Cognitive Processes	0.33*
			Certainty	0.30*

LIWC-Affective Processes	Pearson Coefficient		LIWC-Biological Processes	Pearson Coefficient
Anger Words	0.42**		Physical	0.55**
Sadness Words	0.41**		Sexual	0.53**
Affective Processes	0.41**		Body	0.44**

Correlations with * were significant at $p < 0.05$; Correlations with ** were significant at $p < 0.01$.

Table 3.5: REGRESSION ANALYSIS TO REFINE THE NEW MODEL FOR THE NEW METRIC

Variable Entered	Model 1					Model 2					Model 3				
	B	**SE**	β	**t**	p	**B**	**SE**	β	**t**	p	**B**	**SE**	β	**t**	p
Word Count	7.63×10^{-5}	0.01×10^{-5}	0.65	7.04	< 0.001	7.68×10^{-5}	0.01×10^{-5}	0.65	7.13	< 0.001	8.29×10^{-5}	0.01×10^{-5}	0.71	8.61	< 0.001
Sexual	1.18	0.59	0.21	2.01	< 0.05	1.46	0.47	0.26	3.11	< 0.001	1.62	0.46	0.29	3.54	< 0.001
Commas	0.05	0.05	0.08	0.83	NS	0.06	0.05	0.12	1.24	NS					
Physical	0.18	0.22	0.09	0.80	NS										
R^2	0.74					0.73					0.72				
$AdjR^2$	0.71					0.71					0.71				
SE	0.46					0.45					0.46				
SE	0.46					0.45					0.46				
$F(df_n, df_d)$	31.1(4,45)					41.6(1,45)					61.1(1,46)				

dependent models that were considered. Moreover, it showed large positive
correlations with the six literature models (i.e., $r > 0.51$).

Finally, to verify H5, student t-tests were conducted to explore gender dif-
ferences in the linguistic style and in the kind of published Facebook posts
(Table 3.7). Findings showed that females, compared to males, exhibited
significantly higher average scores in almost all the LIWC categories. Par-
ticularly, females used more negations, more commas, and more personal
pronouns, and principally reflexive and second-person pronouns. Moreover,
they used a wider vocabulary, and posted more often about physicality, body,
sex, negative emotions, and anxiety. On the contrary, males revealed a higher
number of words per sentence and spoke more often about sports. Concern-
ing Facebook activity variables, a few significant gender differences were
found, with females showing longer posts and a higher number of quotes and
photos. Independent-sample t-tests were conducted to compare the scores
of males and females in all six literature models, the Centroid Model, and
the proposed model. Only the Holtzman model ($t_{(48)} = -2.90, p < 0.05$),
the Bergman model $t_{(48)} = -2.75, p < 0.05$), and the Centroid Model
($t_{(48)} = -2.23, p < 0.05$) showed significant differences, with females dis-
playing higher scores. Nevertheless, as supposed in H5, the proposed model
did not show a statistically significant difference between females and males.

3.2.4 Discussion

With the present study, the self-presentation style of a group of Italian
adolescents on Facebook were analyzed. Thus, a new model was defined,
labeled "The Excessive Online Self-Presentation Model" to assess this ten-
dency through the linguistic analysis of public contents of personal social
media pages.

On the whole, as was supposed in the H1, adolescents who published more
wall posts appeared to update their profile pictures, photos, and videos more
frequently, and received more likes and comments. Moreover, participants
disclosed a large amount of personal information (e.g., mobile phone number,
home address) on their personal pages, which confirmed previous research
about adolescents sharing more information than in the past [225]. Hence,
SNSs may represent a suitable context in which they feel comfortable to
disclose intimate data and build their identity [173, 193, 219].

According to H2, the relationship between linguistic style, self-presentation,
and activities on Facebook was analyzed. H2 was confirmed, as specific lin-

Table 3.6: DESCRIPTIVE STATISTICS AND CORRELATIONS AMONG THE SIX MODELS, CENTROID, AND NEW MODEL.

Variable	1	2	3	4	5	6	7	8
(1) - Holtzman Model	-							
(2) - DeWall Model	0.69	-						
(3) - Buffardi Model	0.69	0.41	-					
(4) - Panek Model	0.65	0.41	0.92	-				
(5) - Carpenter Model	0.76	0.70	0.74	0.76	-			
(6) - Bergman Model	0.61	0.37	0.84	0.79	0.67	-		
(7) - Centroid Model	0.86	0.70	0.90	0.90	0.91	0.84	-	
(8) - New Model	0.83	0.51	0.78	0.82	0.67	0.64	0.83	-
Mean	-0.0107	-0.0001	0.0001	0.0001	-0.0001	-0.0001	-0.0001	0.341
Standard Deviation	4.92	4.05	4.01	2.62	3.45	3.98	0.85	1.06
Skewness	0.17	-0.24	0.59	1.28	0.19	0.87	0.61	1.4
Kurtosis	-0.60	0.13	-0.41	1.19	-0.30	1.39	-0.38	1.8
Minimum	-10.49	-10.38	-7.15	-3.26	-7.68	-6.43	-1.42	-1.07
Maximum	11.19	9.71	9.41	8.03	6.99	13.62	1.8	3.84

All reported correlations were significant at the level of $p < 0.01$. The average score of each model was 0 because its nature of zeta-scores sum.

Table 3.7: GENDER DIFFERENCES IN LIWC CATEGORIES AND
FACEBOOK ACTIVITIES.

	Male		Female		
	M	**SD**	**M**	**SD**	*t value*
LIWC Linguistic Categories					
Linguistic Processes					
Negation	2.40	0.90	3.26	0.52	-4.16**
Comma	2.97	1.67	4.49	1.03	-3.88**
Conditional	0.54	0.29	0.77	0.18	-3.22**
Words/Sentence	16.66	8.79	11.31	3.45	2.83**
2nd Pers. Singular	0.19	0.13	0.29	0.14	-2.66*
Personal Pronoun	6.30	1.58	7.11	1.00	-2.16*
Reflexive Pronoun	1.31	0.45	1.59	0.39	-2.37*
Dictionary	51.3	6.91	55.04	4.54	-2.26*
Apostrophe	1.92	0.82	2.52	1.10	-2.22*
Psychological Processes					
Physical	1.14	0.44	1.66	0.32	-4.74**
Body	0.67	0.34	0.99	0.19	-4.7*
Sexual	0.30	0.17	0.39	0.12	-2.17*
Negative Emotions	1.77	0.90	2.06	0.54	-2.01*
Anxiety	0.11	0.07	0.19	0.12	-2.59*
Certainty	1.00	0.40	1.40	0.27	-4.19**
Exclusive	3.95	0.85	4.77	0.68	-3.72
Tentative	1.48	0.51	1.95	0.40	-3.62**
Inhibition	0.13	0.07	0.21	0.10	-3.37**
Personal Concerns					
Body Care	0.04	0.03	0.07	0.05	-3.01**
Home	0.27	0.16	0.38	0.15	-2.47*
Sport	0.08	0.07	0.04	0.05	2.33*
Facebook Activities					
Quotes	53.96	83.96	134.12	98.84	-3.09**
Personal Photos	32.48	33.93	64.88	46.17	-2.83**
Wall Post Average Length	70.63	25.03	91.36	30.47	-2.63*
Photos	312.52	194.88	582.80	532.11	-2.39*

Correlations with * were significant at $p < 0.05$. Correlations with ** were significant at $p < 0.01$

guistic peculiarities were revealed in this study. It was emphasized that people who used more words (e.g. word count), signaled better communication and appeared to publish a higher number of wall posts and quotes [348]. Perhaps it suggested a relationship between publishing more posts and a better strategy in interacting with other people online. Moreover, the results showed how negative emotions correlated with a higher activity on Facebook, and a higher number of posts and receiving more likes. This latter result was also found to be related to anger words and sadness. Such outcomes contrasted previous literature, which asserted that negative emotions were less employed than positive emotions in status updates [38]. On the contrary, this study revealed that negative emotions not only were frequent in posts, but they were even a suitable strategy to interact with a larger audience. Furthermore, positive correlations were shown between the use of first-person singular pronouns and a higher number of longer wall posts, personal photos, and activities that received likes. Since the use of the first-person singular pronouns points to a focus on one's self, it could be congruent with the purpose to publish more wall posts on personal pages, such as more personal photos, in order to receive more likes [294]. Moreover, according to Cegala, such function words also reflect a psychological intimacy and an engagement in social interactions, which could underline the intention to publish more posts to interact with other users [81].

Since this work was dedicated to enhance the comprehension of adolescents' SNSs usage, the literature models were taken into account, and the predicting value of the considered variables were weighted. All six models revealed high mutual correlations and a strong correlation with the Centroid Model, confirming how such models measure similar theoretical perspectives. The models considered different implementations of the same construct, increasing the sensitivity and entirety of the model defined by their sum. The correlation analysis regarding the Centroid Model confirmed its representativeness (i.e., good convergent validity), and effectively integrated the six models. Many variables on Facebook activities were strongly and positively related to the Centroid Model, confirming H3 and supporting literature about how excessive self-presentation in SNSs displays more frequent activity and a publication of more personal data [62, 264]. According to H4, in order to examine which linguistic dimensions were more central to assess an excessive self-presentation style, the correlations between the LIWC categories scores and the Centroid Model score were computed.

This study confirmed the hypothesis in that a relationship between this
kind of self-presentation and the use of negative (i.e., use of sexual words
and anger words) was found, and also endorsed literature [104, 163].

The results also highlighted a correlation between the use of first-person
singular pronouns and excessive self-presentation, enhancing how such indi-
viduals use implicit markers of self-focus [104].

Among the many high correlations and the results obtained by linear
regression analysis, the proposed model selected two main dimensions (i.e.,
word count and sexuality), again confirming H4. A strong association was
reported between the proposed model with all six literature models.

As already shown in previous studies, this study's data described how
excessive self-presentation consists of both positive behaviors, such as so-
ciable behaviors (i.e., talking about friends), and negative behaviors (i.e.,
swear words and sexual language) [271]. Disclosing lots of information to
online friends, highlighted by the presence of a higher number of words per
post (i.e., word count), appeared to increase the feeling of connectedness
with others and reduce loneliness [101]. Moreover, they might have learnt
strategies to better express themselves, such as constructing clearer and more
detailed sentences, which revealed word count as being an important marker
to assess such a trait, and confirming these people as sociable and prone to
keep effective relationships [271]. Nevertheless, Holtzman, Vazire, and Mehl
discovered frequent use of sexual language in narcissistic profiles, support-
ing the analysis of sexual markers to understand both self-promotional and
attention-seeking behaviors [163].

As reported in H5, this study was also devoted to exploring gender differ-
ences in online self-presentation. The results confirmed previous literature
about females publishing more photos, particularly personal photos, quotes,
and longer wall posts for self-presenting [62, 150, 237]. Although our results
revealed gender differences in the LIWC categories, any gender difference
was found in the Excessive Online Self-Presentation Model, confirming H5.
This appeared to be particularly relevant, since it may reveal the same risk,
for both males and females, in engaging in excessive self-presentation, but
with different styles. Indeed, a diverse linguistic style was shown between
the sexes, and the use of Facebook with different purposes for males and
females [86, 150, 197, 318, 352]. Indeed, males disclosed more basic infor-
mation (i.e. sports), which confirmed literature, while females were con-
firmed to use more emotional words, and more psychological processes in

their posts [216, 313]. On the contrary, they employed more reflexive and second-person singular pronouns than males, instead of a higher number of first-person singular pronouns [313]. Noteworthy, while literature revealed that males historically used more swear words than females, which was not shown in this study, the results displayed that females used a higher number of physical, body, and sexual words. Since swear words and sexual language were both considered as negative language, these findings appeared to show a reversed such tendency [271].

The content analysis of Facebook profiles enabled this study to investigate original text material and to assess excessive online self-presentational styles by analyzing personal Facebook pages [377]. The results confirmed how linguistic analysis is a useful tool to investigate self-presentation on SNSs, and can be applied to study emotional and cognitive aspects [104, 163, 191].

3.2.5   Conclusions

In this study, efforts were first made to plan and carry out research that would organize knowledge about self-presentation on Facebook by adolescents, since they appreciate Facebook and use such a social network to spread and build their identity [173]. Exploring one year of contents from their personal Facebook pages gave the opportunity to understand their online social and psychological behavior [189].

Particularly, excessive online self-presentation was explored to understand how it is characterized in adolescence, since this tendency might be signal of a risk situation and has a correlation with narcissism [102, 359].

The main limitation of the study was the nature of the samples, which included 50 high school students from the same institution, although generalizability was balanced by the advantages of studying language use in naturally occurring environments [275]. In addition, our findings seem to be consistent with previous studies (e.g., [62, 104, 163, 264]), and thus they appear to follow a similar trend about excessive self-presentation. Another limit worthy of attention was represented by the complex nature of the relationships between personality and psychological features in general with the cognitive dynamics within social networks. Such a limit should be controlled by enlarging the participant pool and adopting a multivariate approach to the data analysis, in particular controlling the combined effects of the individual features on digital life dynamics.

Future research is recommended to examine how these findings general-

ize to other Facebook populations, such as college students and older people.
The absence of a self-report measure was a partial limitation, although the
content analysis of personal wall posts might be a valid cue to accurately
assess self-presentation, as suggested by Deters, et al., since his study un-
derlined the appropriateness of non-self-report measures to explore online
behaviors and the possibility of detecting self-presentational strategies by
just watching personal profiles [102]. Linguistic analysis is objective and
quantifiable behavioral data, and unlike surveys and questionnaires, it al-
lows a "free" self-presentation in the users' own words [313]. Moreover, a
self-report scale may sometimes encounter several difficulties (i.e. people not
answering all questions, social desirability bias, etc.), and the implementa-
tion of a model based on SNSs contents represents an ecological strategy to
avoid well-known disturbing effects such as the Rosenthal and Hawthorne
effects [6, 301].

The good convergent validity of the model, and the high correlations with
all six literature models, appeared to confirm the potential of this tool to
correctly assess excessive online self-presentation. Future studies are recom-
mended with diverse samples to validate such an instrument and increase
knowledge about online self-presentation in adolescents.

Finally, from a practical point of view, this paper suggested how exces-
sive self-presentation can be assessed by analyzing public posts on a social
network. On the other hand, from a theoretical perspective, the results sug-
gested how the self-presentation dynamics were transformed by the virtual
environment constraints.

Ackowledgments

3.3   Second Study: Self-Presentation and Emotional Contagion on Facebook: New Experimental Measures of Profiles' Emotional Coherence

Abstract- Social Networks allow users to self-present by sharing personal contents with others which may add comments. Recent studies highlighted how the emotions expressed in a post affect others' posts, eliciting a congruent emotion. So far, no studies have yet investigated the emotional coherence between wall posts and its comments. This research evaluated posts and comments mood of Facebook profiles, analyzing their linguistic features, and a measure to assess an excessive self-presentation was introduced. Two new experimental measures were built, describing the emotional loading (positive and negative) of posts and comments, and the mood correspondence between them was evaluated. The profiles "empathy", the mood coherence between post and comments, was used to investigate the relation between an excessive self-presentation and the emotional coherence of a profile. Participants publish a higher average number of posts with positive mood. To publish an emotional post corresponds to get more likes, comments and receive a coherent mood of comments, confirming the emotional contagion effect reported in literature. Finally, the more empathetic profiles are characterized by an excessive self-presentation, having more posts, and receiving more comments and likes. To publish emotional contents appears to be functional to receive more comments and likes, fulfilling needs of attention-seeking.

3.3.1   Introduction

The rise of World Wide Web offered new tools to spread news and information, managing any time. The direct outcome was to increase interactions among different Internet users [50], preparing a suitable ground for the birth of Social Networks (SNSs). SNSs are an interesting growing field [135, 375] for Psychology, Computer Science and Sociology, because their popularity allows researchers to open up new opportunities for reliable affective assessment [175, 358]. At present Facebook is one of most used SNSs [99], and in last decades it has developed an innovative way to create and increase social relationships of people of all ages [38, 254]. Particularly, these technologies let users sharing personal contents on their profile, allowing others

to read and add comments [265]. This is basic for online self-presentation, where users need to find effective strategies to fully express themselves with different audiences [192, 199, 269].

Facebook users easily change their approach and communication with others [292], which may indicate they apply different strategies depending on kind of audiences and type of published message (i.e., public wall posts, wall posts updates, private messages). Choosing what to discover and which emotion may produce positive or negative reactions from audience [38]. Some studies [207, 208] state users seek two main goals through self-presentation: impression construction, to create a desired impression, and impression motivation, to manage others' opinion of the self. This is complicated on SNSs, where audience is various and rather difficult to select [192]. Then, the best strategy appears to be to show only acceptable information for all targets [161], while superficial messages appear not to be suitable in creating positive impressions [38]. However, such information represents a self-disclosure of personal issues, such as attitudes, personal hobbies, experiences and emotions.

A recent research [38] investigated how the use of emotions, both positive and negative, affected the linguistic style for self-presentation on Facebook. Findings confirmed different adoptions of language style depending on the audience, and highlighted a major use of positive emotions, as opposed to negative emotions, in status updates. Therefore, emotions appear to be central not only in in-person interactions, but also in online communication [127, 166], where they can be spread and reach other people, who may be affected in a sort of "empathetic contagion" [105]. Indeed, one relevant question was whether this contagion would be effective in the cyber-world. Research exploring online empathy has especially examined support communities or "thematic" forums (e.g., sports) [278, 284], or Instant Messaging [118], analyzing empathetic responses to the posts. In these studies, empathy was defined as the capacity to both feel and understand others' feelings and thoughts [205], which allow to predict others' intentions and experience the same emotion [34, 115]. Empathy is basic to build appropriate social relationships [363] and is a predictor of pro-social behaviors [114, 243] and perspective taking abilities [121].

Studies on online empathy revealed that online support in thematic communities consisted of providing practical information and fostering emotional attachment [384]. Participating members build social relationships and are

more likely to write empathetic messages than new members [278]. Moreover, [118] found that an empathetic communication had a significant influence on online interpersonal trust, where more empathetic people were more trusted by others. Moreover, a study enhancing gender differences in virtual communities underlined how females published more empathetic messages than males [284]. Facial and body expressions can be helpful to empathy in understanding one's behavior [37], but online interactions are missing the use of non-verbal communication, complicating the empathetic answers [95]. By contrast, the virtual environments are feasible to precisely detect and record every gesture, voice feature, non verbal behavior, avoiding difficult data mining/coding of empathy and emotional contagion in real settings. We recently tested such aspects, confirming that the mood of a short message, such as those observed within online social networks, forums, and web-based chats, can be detected and be informative about the dynamics of the system and the topological position of the writer [89].

The concept of "virtual empathy" (i.e., the existence of an empathy capacity for humans into virtual environments) could state or predict a measurable effect of the mood polarization of a stimulus (e.g., messages, photos) on the inner psychological state of the observer. As a consequence, some effects on the subsequent production of the observer should be detectable, as well as a possible coupling between the behavior of the observer and the post maker.

Regarding this, some studies began to explore the computer-mediated communication [9] and the spread of emotions [148, 152]. Results showed that inducing negative emotions elicited negative messages in participants, confirming that the emotional contagion on virtual environments is not only detectable, but clearly evident even without face-to-face interactions. Recently, emotional dissemination was analyzed on Facebook, examining posts and status updates. Findings showed emotions expression conditioned others' emotional posts, eliciting a congruent emotional contagion: that is, people having friends who published positive posts were more likely to publish positive messages as well. Then, emotions transmission does not occur only after in-person interactions, but also through computer-mediated communication [190, 191].

Despite such interesting findings, no studies have yet investigated emotional coherence between wall posts and received comments. When a user publishes a status, are comments he/she receives emotionally congruent with

that status? The present research purposes to explore this aspect by means
of the development of two experimental metrics assessing the emotional load-
ing and the emotional coherence.

Excessive Self-Presentation, Narcissistic Trait and Emotional Mood of Posts

Self presentation on SNSs has been largely explored in literature, and re-
searchers also investigated the origins of an excessive online self-presentation,
wondering whether a frequent posting might be a signal of a narcissistic
trait [46, 77, 102, 300]. Literature described narcisissm [70, 237, 362] as a per-
sonality trait and not a clinical disorder, and as the tendency to an inflated
and positive self-concept, with exhibitionism and attention-seeking behav-
iors.

SNSs are suitable to achieve narcissistic goals, and they may also in-
centive to self-promote and to engage superficial behaviors [62]. Ryan and
Xenos [305] confirmed this, finding Facebook users to be more narcissistic
than non-users.

Other studies referred that narcissistic and excessive self-presentation
strategies on SNSs were related to publish more self-promotional informa-
tion [268] and to have more friends [46, 62], besides using more swear and
anger words [77], sexual words [163] and singular first-person pronouns [104].
It appears that narcissistic people engage in more self-promotional and
self-disclosed behaviors, as frequent status updates, to seek for others' at-
tention [264]. A study investigated how personality traits influenced self-
presentation, self-disclosure and linguistic and emotional content of messages
on Facebook [377]. Results displayed narcissists disclose more personal in-
formation and self-present more than others, revealing a tendency to an
excessive self-presentation.

Despite a frequent negative relation between narcissism and empathy on
SNSs and the widespread knowledge about SNSs promoting narcissism [62],
another research revealed that participating to SNSs has an association with
empathy, too [139]. To investigate the presence of emotional loading in SNSs
narcissistic posts, and the association between online narcissism and empa-
thy, is nowadays of particular interest because of the recent findings about
the negative correlation between empathetic behaviors and the narcissistic
style [188]. Moreover, more information about linguistic strategies in the
narcissistic trait and in the excessive self-presentation could be provided.

Unfortunately, few studies analyzed these aspects.

Given that some studies explored linguistic contents in the narcissistic trait and excessive self-presentation on Facebook [104, 163], revealing a peculiar use of communication strategies for attention-seeking goals [65], a second purpose of the present study was to analyze all posts of 50 Facebook profiles in one year through the linguistic software LIWC [273], and to explore content emotional features of posts and comments in excessive self-presentation profiles. Particularly, we meant to identify an "empathetic coherence or incoherence" between posts and received comments in different profiles.

Aims of our Study

The main challenge of our study concerns about the dynamics (e.g., spreading and sensitiveness) of the emotional coherence on Facebook among Italian adolescents. We focused on adolescents' sample because recent studies underlined how most of members of SNSs are young people [173].

The first property required to the measure is the ability to detect the emotional content (i.e., sentiment) of a web-based post (e.g., message, photo, news, etc). Given the literature about the "Sentiment Analysis" [164, 165, 347], several tools and approaches can be adopted to fulfill this first challenge. For this reason, our study analyzed 50 Facebook users' profiles, coding each published post or activity during a year (Table 3.8).

In our study we first define for all the Facebook profiles an emotional loading for each post and comment by means of the development of two operative metrics (i.e., negative and positive mood indicators).

Once the emotional loading of each post and comment was evaluated, the "emotional coherence" of each profile has been defined as the normalized correspondence between each post mood, and its average comments moods, assessed by the Pearson χ^2 statistics. As a consequence, the empathy level of a profile is defined as the degree of agreement between the moods of the posts, and the moods of the comments received by each post.

Finally, the average emotional loading and coherence of profiles have been related with the gender, with the variables describing the social network usage, and with the self-presentation style of individuals.

3.3.2 Methods

Participants and Procedure

Participants were 50 students (50% females) recruited from a Tuscan high
school by means of a convenience sampling. They ranged in age from 15 to
19 (M=16.95, SD=1.08). All participants had a Facebook account and were
involved as volunteers.

The data collection carried out during the "ARCA project". The agreement of the high school to participate was obtained from the principal. The
professors of the classes involved, and a research assistant introduced the
aims of the survey, and the confidentiality issues to the students. Before
the students' participation in the research, parental consent and adolescent
assent was obtained.

To analyze one year of the Facebook usage on participants' profiles, a
Facebook account was created using the recruitment coordinator's contact
information, with a research logo as the profile picture. Before befriending a
participant's profile, we sent a private message inviting him/her to participate in the research. Participants were explicitly notified that the researchers
would have access to their Facebook profiles for one year and we communicated that the data would be stored anonymously. All the 50 students gave
permission to save their Facebook pages to be used in the present research.

Measures

Facebook Page Coding (observation grid)   From each Facebook profile, some relevant information were extracted, both concerning the directly
available data (i.e., friends, followed people, visited places, famous quotes,
pages with like), and some objective criteria calculated and coded by the
year-long analysis of each profile (i.e. complete activity, wall posts, profile
picture edit, personal photos, photos, videos, likes, activities with likes, comments, posts with comments, wall posts length, wall posts average length).

We analyzed one year of participants' activity on Facebook, considering a total of 32368 activities (28878 of which were wall posts), and 62083
comments.

Linguistic Analysis   In order to assess the posts emotional loading, we
used the Linguistic Inquiry Word Count program [273]. LIWC analyzes
transcripts on a word-by-word basis and compares words with a dictionary

Table 3.8: *Facebook Profile Features.* The descriptive statistics related to the sample's Facebook profiles features are reported.

Facebook Variable	M	SD	Min	Max	Skewness	Kurtosis
Friends	3085	1089	642	4970	-0.46	-0.48
Followed people	12	11	0	46	1.55	1.88
Visited places	64	124	1	644	3.58	15.48
Famous quotes	94	99	1	333	1.21	0.28
Pages with likes	547	781	30	4762	4.21	21.28
Complete activity	647	529	29	2609	1.84	3.64
Wall posts	578	491	22	2399	1.92	3.97
Profile picture edit	23	20	0	81	1.11	0.63
Personal photos	49	43	1	206	1.27	2.18
Photos	218	194	15	908	2.23	5.65
Videos	62	93	1	562	3.87	17.84
Likes	12646	13280	465	66815	2.03	5.06
Activities with like	641	520	29	2537	1.81	3.42
Wall post with comments	263	179	21	746	1.14	0.81
Comments	1242	926	121	4494	1.61	2.83
Wall posts length	46814	42021	2010	193966	1.68	2.68
Wall posts average length	81	30	31	183	1.30	2.78

The variables that did not show Gaussian distribution have been transformed by means of Logarithmic function.

related to 70 linguistic, affective, cognitive and social processes. LIWC's
psychometric properties and external validity have been established in a large
number of studies, and has been used to examine the relationship between
language and emotion, personality, and deception, among others [348].

In this study, all the sampled profiles have been considered as separated
elements, and the LIWC analysis concerned the entire production (i.e., the
posts) as a single narration (Table 3.9).

Table 3.9: In Table are reported the LIWC categories discriminating effec-
tively the posts/comments mood. In particular the significant Fisher F, and
the associated sum of squares are reported and connected with the specific
mood assessed by them. The signs between brackets after the mood polar-
ization indicate the sign assumed by the terms in the operative models.

Variable	Sum of Squares	F($p < 0.01$)	Condition
Negative emotions	4.009	21.063	Negative [+]
Swear word	5.356	12.418	Negative [+]
Positive feeling	2.002	12.309	Positive [+]
Anger word	6.000	11.355	Negative [+]
Positive Emotion	2.839	10.169	Positive [+]
Sadness word	4.562	9.834	Negative [+]
Numerals	0.939	8.376	Negative [-]
Third-Person plural verb	3.441	6.214	Negative [+]
Family	5.631	5.937	Positive [+]
Question marks	3.374	5.587	Positive [+]

Excessive Self-presentation Model Since excessive online self presen-
tation could be an indicator of narcissism [102, 300], we used a previously
developed model, labeled "Excessive online self-presentation model", to di-
rectly assess this tendency, through the linguistic analysis of public contents
of personal pages.

This measure was originated by an observation grid coding the Facebook
activities of our participants (e.g. wall posts, comments, photos, etc.), and
the analysis of the language style obtained through LIWC analysis of their
Facebook published posts. For more details please refer to [144]. Such a mea-
sure has been defined investigating the linguistic features of the individuals'
Facebook wall posts, merging recent studies validating online measurements

of the narcissistic trait [46, 62, 77, 104, 163, 268], with the theoretical models coming from classical literature.

The final model presented in [144] is composed by the two LIWC-based parameters (i.e. *"Word Count"* and *"Sexual"*) provided by the linear regression analysis.

Creating metrics to measure emotional load and emotional coherence   The assessment of *Profiles Emotional Coherence* (i.e., Facebook Empathy Profile) includes a Sentiment Analysis of the wall posts and the comments to identify their "mood". In particular, the Facebook Empathy profile level is not the user's level, but it is the commentators' average level, in other words the comments accord level with a particular wall post. It was possible to define an Emotional Load of the wall post and its comments and, subsequently, a *Profiles Emotional Coherence* defined as the degree of correspondence normalized between the wall posts mood and its comments.

The Sentiment Analysis was conducted starting from the LIWC software analysis. Based on the LIWC categories we defined two metrics to estimate the emotional content of posts and comments: the Positive Mood Indicator and the Negative Mood Indicator.

Data Analysis

Emotional coherence and loading indicators development   Step 1: The wall posts that did not receive any comments and those that were photos, videos, music, or famous quotes were excluded from the original sample (14644). Four judges in the field of social psychology independently examined a random sample of 500 wall posts extracted from the new set of 14234. The judges selected 144 wall posts, in order to achieve 48 wall posts defined by them as "Negative", 48 as "Positive" and 48 as "Neutral", comparing their emotional content. These subgroups of wall posts were used as a criterion to develop the model for the sentiment analysis.

Step 2: It was carried out an analysis of variance (ANOVA) to identify which LIWC variables showed a discerning capacity in identifying the condition of "Negative Mood Indicator", "Positive Mood Indicator", or "Neutral Mood Indicator". We chose the LIWC categories that reported a significant F Fisher's score. Moreover, to assess the main effects and to evaluate which condition the LIWC variable was able to discriminate, we adopted the Scheffé test [310], and the most discriminating variables were organized and

ordered by F-test score (Table 3.9). A greater value of F-score corresponded
to a greater ability to discriminate an emotional condition with respect to
the other two (e.g., positive mood against negative and neutral mood).

Step 3: After identifying the LIWC most discriminating categories, we
have also calculated the Z-scores (i.e., associated to the F values) of such
categories for each condition "Negative Mood Indicator", "Positive Mood
Indicator", or "Neutral Mood Indicator". After sorting the Z scores (Fig.
3.1), the LIWC variables that reported higher average values on a specific
mood and lower values on the other two were selected as the "best" predic-
tors.

Step 4: Based on the LIWC Best predictors, we have defined three met-
rics to estimate the emotional content of posts and comments (Negative
Mood Indicator, Positive Mood Indicator and Neutral Mood Indicator). Af-
ter metrics verification, we decided to not consider the posts with neutral
mood, despite the clarity construct emerging from the LIWC semantic and
syntactic categories analysis. This decision was motivated by the huge vari-
ability exhibited by neutral mood wall posts (as opposed to positive and
negative mood wall posts), and thus to avoid the risk of excessive and im-
possible generalization of the neutrality construct.
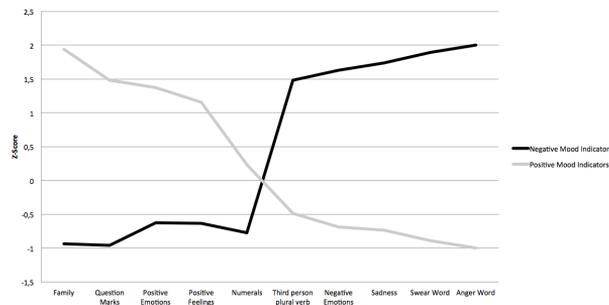
Figure 3.1: The z-scores associated with the LIWC variables significantly
related with the operative criteria, and concerning the mood polarization
are reported.

Inferential analysis   The statistical analysis comprised five different steps.

In the first one, the *Student t* statistic has been used to compare the sub-
samples of posts categorized as *positive*, with those with a *negative* emotional

loading. The differences between the two sub-samples have been investigated on the observable quantities defined as order parameters of our study (i.e., gender, Facebook variables, Positive and Negative Mood Indicators of comments). To balance the sub-samples, a bootstrap sampling has been adopted and a final sample of 3392 units has been analyzed.

The same strategy has been used to compare the posts with an emotional loading different from 0 (i.e., positive plus negative posts), and those with no emotional loading (i.e., neutral posts). In this case the two sub-samples resulting from the bootstrap method were composed by approximately 6380 units.

To estimate the Facebook Empathy profile level, we used the Pearson Chi-square test, assessing the agreement degree between the emotional loading of each post and its comments.

To evaluate the relation between the empathy and the excessive self-presentation, we simply computed the Pearson correlation between the scores reported to the Chi-square test, and all the observable quantities of interest.

Finally, to compare the participants with an *High empathy profile* with those with a *Low empathy profile*, the sample has been split in two, depending on the median reported to the Chi-Square test ($Median = 0.74$). Subsequently, another independent sample Student t test has been calculated with respect to all the independent variables.

3.3.3   Results

Creation of Two Metrics to Weight the Emotional Load of a Message

The analysis of variance (ANOVA) on the 144 posts selected by judges (i.e., 48 negative, 48 positive and 48 neutral) was focused on identifying which LIWC variables showed a discerning capacity in the three conditions and to calculate two metrics (Positive Mood Indicator and Negative Mood Indicator). A greater F Fisher's score corresponds a greater capacity to discriminate one of the emotional conditions with respect to the other.

Table 3.9 shows the LIWC categories that have obtained a significant F Fisher, sorted in descending order in respect to its score. Some significant categories, such as body, and comma, were not able to discriminate the emotional content of the posts (i.e., test Scheffé not significant or negligible effect) and therefore they were not used to build the two metrics.

Furthermore, we have calculated the Z-scores for the LIWC variables that
were able to discriminate the post emotional content, i.e. to produce two
different scores for each post respectively indicating the positive and negative
"load" of the message. The resulting graph (Fig. 3.1) shows that there is a
clear inverse correspondence between the negative mood variables and those
of positive mood.

As shown in Equation 3.1, regarding Positive Mood Indicator, the LIWC
best predictors were the variables Positive Feeling (PF), Positive Emotion
(PE), Family (Fa), and Question Marks (QM), while concerning Negative
Mood Indicator (Equation 3.2) the LIWC best predictors were the categories
Negative Emotion (NE), Swear Word (SW), Anger Word (AW), Sadness
Word (SaW), Numerals (Nu), and Third-Person Plural Verb (TP).

$$PM_i^N = NE + SW + AW + SaW - Nu + TP \qquad (3.1)$$

$$PM_i^P = PF + PE + Fa + QM \qquad (3.2)$$

where, PM^P and PM^N respectively indicate the positive and negative
mood score for the post i.

The several variables of the models were added or subtracted to the
total scores if Z-score sign was positive or negative (e.g., the LIWC variable
"Negative Emotion" appeared as characterized by a Z-score of 1.63 for what
concerns the negative load, and a Z-score of -0.69 for the positive load;
while on the other hand, the variable *"Numerals"* obtains a negative load
of -0.77, and a positive load of 0.23). Therefore, in the former case the
Negative Emotion variable has been adopted as a positive term to add for
the *Negative Mood Indicator* (i.e., its presence increases the probability to
have a post with a negative mood), while the latter Numerals variable has
been adopted as negative term to subtract in the same model, because its
presence decreases the probability to have a negative post.

The descriptive statistics related to the Facebook profiles' features are
reported in Table 3.8.

Regarding the 14234 posts, it has been calculated the descriptive statis-
tics relating to the variables number of likes, number of comments and scores
of the negative and positive mood variables. Each post had a mean score of
18.15 (SD = 23.154) for number of likes and 2.06 (SD = 4.078) for number
of comments. The average score for the Negative Mood Indicator was 4.915
(SD = 15.939) and for the Positive Mood Indicator was 5.776 (SD = 12.689).

Concerning the comments, it has been calculated the average score of the negative (M = .877, SD = 5.204) and positive mood indicators, too (M = 3.046, SD = 12.62).

The frequency distributions of the mood indicator variables do not appear normal (i.e., skewness was large). This is due to the abundance of posts and comments with a zero score. These posts (6380) and comments (9940) have been removed from the analysis, since they are not emotionally determined.

Thus, about the 14234 posts, those deemed valid were 7854 (55.2%) of which 4462 identified as positive and 3392 negative, while comments were deemed valid 4294 (30.2%), of which 3147 positive and 1147 negative.

Descriptive Analysis

A preliminary analysis tested that no gender differences are detectable for what concerns all the order parameters such as number of likes, number of comments, negative comments scores and positive comments scores.

The summary of the inferential analysis are reported in Table 3.10. First, it was carried out a balance through bootstrap method to conduct a Student's t-test in which the sub-sample of positive posts has been compared to that of the negative posts with respect to the variables mentioned before. Two groups were obtained characterized by a same high number of units (3392). From the analysis carried out, there was a unique significant relationship between mood posts and negative comments. The negative posts have a significantly higher probability of receiving a negative comment ($t = 3.523, p < 0.01$).

Subsequently, another Student's t-test was performed to compare posts expressing emotional content (negative or positive) and posts obtaining a zero score for the positive and negative mood variables, in other words the 6380 posts that had previously been removed from the analysis. The sub-sample containing emotional posts (6380) was obtained using the bootstrap method. The analysis showed that the emotional posts received significantly more "Likes" ($t = -6.667, p < 0.01$), more comments ($t = -2.8, p < 0.01$), more negative comments ($t = -2.82, p < 0.01$), compared to neutral posts.

Table 3.10: *Differences between Negative VS Positive posts, and Neutral Vs
Emotional posts, with respect to the number of likes, number of comments,
negative comment scores, positive comment scores.* The Table reports the
significant Student t values describing the differences between groups. All
the statistics reported in Table are significant at a level of $p < 0.01(**)$.

Variable	t	Group	M	SD
Number of likes	1.748	Negative Posts	21.30	23.02
		Positive Posts	20.31	23.42
Number of Comments	-0.021	Negative Posts	2.09	4.12
		Positive Posts	2.09	3.70
Negative comments scores	-3.523**	Negative Posts	1.25	5.79
		Positive Posts	0.79	5.10
Positive comments scores	-1.007	Negative Posts	3.05	10.39
		Positive Posts	3.78	15.79
Number of likes	6.667**	Neutral Posts	15.37	23.00
		Emotional Posts	17.95	20.39
Number of Comments	-2.800**	Neutral Posts	1.93	4.16
		Emotional Posts	2.13	3.96
Negative comment scores	-2.820**	Neutral Posts	0.76	4.96
		Emotional Posts	1.03	5.51
Positive comment scores	-1.716	Neutral Posts	2.87	12.52
		Emotional Posts	3.27	13.63

Tendency to the Emotional Coherence Between Post and Comments

After classifying all the wall posts and comments in relation to the mood, we calculated the Chi-square statistic, both for the entire sample and for each subject separately, to assess the degree of consistency between the post mood and its comments mood. We measured both a general level of empathy profiles, and a particular level of empathy for each individual profile.

The general Chi-square shows a significant relationship between post mood and comments mood ($Chi^2 = 26.44, p < 0.01$). There is a tendency to mainly respond in a positive way to positive than negative posts. Nevertheless, the two posts categories elicit the same absolute number of negative comments. Thus, positive posts show lesser percentage of negative comments than negative posts because they are greater.

Classification of the subjects on the basis of the Emotional Coherence of their Facebook profile: empathic detector   We classified the individuals' profiles to discriminate those "more" empathetic, that is profiles for which the relationship between comments and posts appeared to be stronger (i.e. Chi-square greater). Each profile was analyzed separately from the others and therefore it represented a sub-sample, and we considered all wall posts, and the associated comments. We calculated 50 values for the Chi^2 statistic.

The participants' profiles were assessed through the significant statistical of the parameter Chi^2. It was possible to identify the most empathetic profiles ($n = 8$), i.e. Facebook profiles for which a statistically significant relationship between post and comment mood was found ($Chi^2 > or = 4$). These participants were defined as subjects with highly empathetic profile. However, other profiles can be characterized also in terms of "intensity of the degree of empathy profile", on the basis of their Chi^2 absolute value associated with.

Relation Between Excessive Self-Presentation and Empathy Profile

To evaluate the relationship between the Excessive Self-presentation style and the Empathy profile, first of all, a correlation analysis was carried out among the parameters used to estimate the empathy profile of each par-

ticipant (i.e. Chi^2 value), with the Facebook variables, LIWC categories and Excessive Self-Presentation Model. The most significant results are the following.

Regarding the Facebook variables, the participants with more empathetic profiles publish a greater number of famous quotes ($r = 0.344, p < 0.05$), write longer average posts ($r = 0.288, p < 0.05$) and receive a greater number of comments ($r = 0.307, p < 0.05$).

About the LIWC categories, the participants with more empathetic profiles use more words relate to the physical ($r = 0.394, p < 0.01$), the body ($r = 0.352, p < 0.05$), the sensorial processes ($r = 0.305, p < 0.05$), more words associated with the possibility ($r = 0.309, p < 0.05$) and more commas ($r = 0.304, p < 0.05$).

Finally, regarding the Excessive Self-presentation Model the participants with an excessive self-presentation elicit a higher number of empathetic comments by their Facebook friends compare to the other subjects ($r = 0.273, p < 0.05$).

Subsequently, a sample discretization was carried out based on the Empathetic detector representing the degree of coherence on the emotional profile analyzed (i.e. Chi^2 value associated with each Facebook Profile). We defined two sub-groups respectively called "Little empathetic Profiles" and "High Empathetic Profiles". The first group was composed by the Facebook Profiles that reported a lower Chi^2 score than the median of the entire sample ($median = 0.74$) while the second group was composed by Facebook profiles with higher scores.

In Table 3.11, the significant statistical tests describing the differences between the little and high empathetic profiles in relation to the followed variables are reported (e.g. Facebook variables, LIWC categories and the Excessive Self-Presentation Model).

Student's t-test was conducted. About the Facebook variables, the participants with more empathetic profiles publish longer posts, more comments, more posts with comments, more personal photos, more posts, more average long posts, more complete activity, more activities with like, and more famous quotes. Concerning the LIWC categories, the participants with more empathetic profiles use more singular second person verbs, more words, more words related to physical, sensorial processes, possibility, sex, and money. These subjects utilize more present tense, singular first person pronouns, commas, conditional sentences, and less words with more than six letters.

About the Excessive Self-presentation Model, the participants with more empathetic profiles report a higher score on our metric (Table 3.11).

Moreover, the gender shows a significant effect, with the females appear as characterized by a more empathetic profile ($t = -3.324, p < .01$).

3.3.4   Discussion and Conclusions

Confirming the literature [38,166], our results show that participants publish a higher average number of posts with positive emotional loading, compared to an average number of posts with negative emotional loading. Furthermore, it is confirmed that to publish negative emotional posts increases the likelihood of receiving negative comments [148,152]. The research also highlights that to publish a post with emotional charge, either positive or negative, corresponds to get more likes, and comments, assuming a precise linguistic strategy for online self-presentation [38].

The general Chi-Square analysis showed a significant relationship between posts and comments mood, in particular there was a greater tendency to respond in a positive way, rather than negative, to positive posts and vice versa. The results appear to confirm the possibility of an emotional coherence through an Internet-based communication, stressing how emotional dissemination does not require face to face interaction, but can occur even during online interactions [190,191].

To compare the subjects with an *High Empathetic profile* with those with a *Low empathetic profile*, the sample has been split in two sub-samples, depending on the median reported to the Chi-square test ($Median = 0.74$). Regarding the gender effect, previous studies have shown that females post more empathetic comments than males [284]. Our study partially confirms such results, showing that the females profiles appeared to be more empathetic (i.e., a stronger emotional coherence between posts and comments mood) than those of males.

In the second part of our work we investigated the relations between the profile empathetic level, with the other factors of interest got into account in the present study. We found that the more empathetic profiles have a higher activity, receiving a higher number of likes for each activity. Such profiles are characterized by a greater number of wall posts, that tend to be longer and to receive more comments. The profiles with a greater empathy shown a greater number of personal photos. The linguistic and semantic analysis revealed how the more empathetic profiles use a higher number of

Table 3.11: *Differences between High and Low Empathetic Profiles.* The Table reports the significant Student t values describing the differences between users with high or low empathetic Facebook profiles. All the statistics reported in Table are significant at a level of $p < 0.01$ (**) or $p < 0.05$ (*). The values regarding the LIWC variables are frequently represented by percentages.

Variable	t	Group	M	SD
Wall post length	-3.187**	Low	30109	29312
		High	64910	46591
Comments	-3.094**	Low	882	518
		High	1630	1109
Wall posts with comments	-2.953**	Low	196	119
		High	335	206
Personal photos	-2.885**	Low	33	33
		High	66	47
Wall posts	-2.809**	Low	402	293
		High	767	589
Wall post average length	-2.618**	Low	71	24
		High	92	32
Complete activity	-2.572*	Low	472	352
		High	837	623
Activities with like	-2.570*	Low	468	348
		High	827	613
Famous quotes	-2.217*	Low	65	80
		High	125	110
Singular second person verb	-3.514**	Low	1.42	0.63
		High	2.02	0.57
Word Count	-3.301**	Low	5138	5002
		High	11297	7966
Physical	-3.082**	Low	1.22	0.48
		High	1.59	0.35
Sensorial processes	-2.954**	Low	1.12	0.38
		High	1.37	0.17
Possibility	-2.776**	Low	1.54	0.49
		High	1.91	0.46
Sexual	-2.628*	Low	0.29	0.15
		High	0.40	0.14
Present tense	-2.254*	Low	7.98	1.59
		High	8.81	0.90
Word with more than six letters	2.214*	Low	20.95	2.53
		High	19.48	2.11
Comma	-2.212*	Low	3.29	1.50
		High	4.20	1.54
Singular first person pronoun	-2.146*	Low	1.88	0.64
		High	2.32	0.80
Conditional	-2.092*	Low	0.58	0.28
		High	0.74	0.23
Money	-2.049*	Low	0.09	0.06
		High	0.12	0.06
Excessive Self-presentation Model	-3.770**	Low	-0.39	0.61
		High	0.42	0.89

singular first person pronouns, verbs in the singular second person, a greater number of words, and particularly more words related to sex and physical. Finally, the more empathetic profiles are characterized by a more excessive self-presentation style on SNSs.

Such results seem to confirm the literature regarding the relationship between narcissism and excessive self-presentation on SNSs. Previous studies [62,264] emphasized how the narcissistic trait is related to an intense activity on Facebook, such as connecting to many friends and publishing more wall posts and photos. In addition, another research adopting LIWC [104] found that narcissistic people published more self-promoting and sexy photos, and had a more aggressive language when singular first person pronouns were less employed. Moreover, a study [163] pointed out that narcissistic people used to talk more about sexual topics, while another study [46] underlined how narcissists may be characterized by a high degree of personal information disclosure, status and personal photos updating.

The main result of our study indicates how the subjects with an excessive self-presentation style elicit a greater density of empathetic comments. In general, the individuals reporting a greater score on the Excessive Self-presentation model are those who have the more empathetic and coherent emotional profiles. In this way, our study appears to confirm how to publish emotional contents on own profile can increase the likelihood of receiving more comments and likes, fulfilling a goal of attention-seeking, as narcissistic people have. Thus, to post on the profile positive and negative emotional contents might be considered an effective way to satisfy the that need.

The study has two limitations: first, the socio-demographic features of participants who belong to the same municipality. To generalize and verify the two metric models, an extension toward different countries is needed. Also, an explicit measure to assess narcissism is missing. This is partially mitigated by using a real-world Facebook dataset and taking into account six validated narcissistic models to build our Index. Noteworthy, three of such models applied LIWC to evaluate the trait. Moreover, Deters and colleagues [102] underlined the appropriateness of non-self-report measures to explore online behaviors because the linguistic analysis is objective and quantifiable behavioral data, and unlike surveys and questionnaires, it allows a "free" self-presentation in the users' own words. Moreover, a self-report scale sometimes may encounter several difficulties (i.e. people not answering all questions, social desirability bias, etc.) [313]. Nevertheless, a confirmatory study is

recommended to verify the construct validity. Unfortunately, few studies
investigated the empathetic coherence between posts and received comments,
which precludes to fully compare these results on literature. Further studies
are suggested, to increase knowledge on linguistic strategies of online self-
presentation on SNSs.

The main scientific contribution of our work is the processing of new
effective measures for the assessment of emotional loading on SNSs posts,
using little public information. Two ICT algorithms ("Positive Mood In-
dicator" and "Negative Mood Indicator") were applied to evaluate such a
dimension. The LIWC analysis of the posts appears to be particularly rec-
ommended and suitable to increase the reliability of the measures, as Panek
and colleagues [268] suggest. The model, appearing robust even for short
messages, could be used also for other SNSs, such as Twitter, Google+ both
characterized by short messages, the typical style of the new web based vir-
tual environments. Moreover, our study analyzed all posts on 50 profiles
for one year, improving previous studies which attempted to merge posts
contents and style [78].

Acknowledgments

3.4 Third study: Small Group Processes on Computer Supported Collaborative Learning

Abstract- Today, information and communication technologies (ICTs) are of-
ten applied to assist learning processes. Peculiar objectives of ICT use in this
topic are to facilitate collaboration and to increase learning through sharing
and distributing knowledge. This study aimed to investigate the effects that
a small group has on the individual and collaborative learning. A virtual
environment was used to study the dynamics of social behaviors in collab-
orative and non-collaborative experimental conditions. Our results seem to

support the hypothesis that social scripts are started, even when people are in non-interactive situations, and this is shown in virtual environments, too. Such outcomes, and the virtual interactions content analysis may suggest useful advice about collective reasoning and e-learning dynamics, which are very relevant topics in the study of web communities and educational communities.

3.4.1   Introduction

In the field of learning processes, the information and communication technologies (ICTs) are usually applied in order to increase learning through the sharing of knowledge, and computer supported collaborative learning (CSCL) is an educational paradigm that tries to pursue this goal [35]. CSCL may create benefits for the members of a collaborative group, increasing the sharing of culturally different knowledge [280].

To estimate the "costs and benefits" of remembering in a group, the collaborative recall paradigm was designed (for review, see [154]). In this paradigm, the influence of recalling with someone else is often assessed by comparing the result of collaborative groups (a group of people learning together) with the result of nominal groups (a group of people tested individually) or individuals alone [153].

Research on CSCL has shown mixed results: may occur the phenomenon of collaborative facilitation, that is groups outperform individuals, or the process of collaborative inhibition, namely groups perform the same as or even worse than individuals [255].

Data from the DRM Paradigm

Some collaborative recall experiments have employed the Deese–Roediger–McDermott (DRM) paradigm [297]. The DRM paradigm contains lists with semantically related words (e.g., bed, rest, wake, tired, dream, etc.), that converge on the most common words (i.e., "critical lures"; e.g., sleep). These critical lures are removed from the lists. By means of DRM paradigm, researchers may measure the false recall of both critical lure and other words mentioned in error during collaboration (e.g., non-studied words).

Some studies have evaluated collaborative recall performance in a group context and these studies showed mixed results. Through DRM list, one study demonstrated that participants within collaborative groups had a

worse performance compared to those of equivalent sized nominal groups
([36] Experiment 1 and 2). In contrast, another study showed that collab-
orative groups recalled more studied words than nominal groups [226].

This inconsistency of results may be explained by the size of the groups:
more members in a group could generate more disruption during recall, in-
creasing the possibility of collaborative inhibition [351]. Moreover, some
researchers assumed the importance of the encoding strategies of the lists.
In particular, a study found that an imagery strategy could decrease false
memories more than a word-whispering strategy [261].

Few studies have evaluated false learning in subsequent individual recall,
in order to understand if collaboration has effects on recall. A study found
that prior collaboration, if characterized by group pressure, retained later
individual critical lure [351]. Moreover, another research showed that there
was an increased individual recall after collaboration [153].

Gender Composition Group Impact on CSCL

A remarkable topic about collaborative learning and recall is whether all
members of a group earn a similar profit by working in such environ-
ments [286]. Some studies not concerning the DRM paradigm have analyzed
the gender effect in groups performing CSCL. Literature is pretty discor-
dant, since studies supported same-gender groups because they work more
purposefully than mixed-gender groups [43]. On the contrary, other studies
revealed that mixed-gender groups perform better in CSCL, with respect to
same-gender groups [106]. Recently, another research highlighted that female
groups and balanced-gender groups obtain a better outcome in CSCL [385].

Analyzing the individual performance within the CSCL, a research dis-
covered that female students in same-gender groups had a better perfor-
mance than those in mixed-gender groups [106]. Instead, other researchers
showed that male participants in mixed-gender groups significantly outper-
formed compared to males in single-gender groups [385] or to female par-
ticipants in mixed-gender groups [155]. Some individual tendencies may
clarify such diverse findings: females appear to be more comfortable in
same-gender [331,385], while males appear to be more comfortable in mixed-
gender, such as gender-balanced and gender-majority groups [385]. By con-
trast, a research revealed that both males and females perform better in
same-gender groups, as they may better understand the style of communi-
cation applied [218].

The Effect of Social Interaction on CSCL

To understand what variables affect the CSCL, it is also necessary to analyze the interactions of the group, because the success or failure of one performance may be attributed to the content of the interaction that precede it [42]. This analysis seems particularly significant in the CSCL, where social interaction is the instrument through which participants, verbalizing their opinions, can develop a collective knowledge [194]. Moreover, participants' interaction is one of the most important predictors of success in online environments [13]. More specifically, the interaction style was positively correlated with the performance of virtual teams [281].

Aims of the Study

The general aim of this study was to compare costs and benefits for recall in three different experimental conditions (i.e., individual, nominal and collaborative), using two lists of the DRM paradigm [297] by means of a virtual environment recently implemented by our lab [140, 142].

This study sought to verify the impact of different variables: 1) gender composition groups (i.e. same-gender, mixed-gender and gender majority group), 2) group size (i.e. individual, dyad, triad and quartet), 3) stimulus materials (i.e. list of concrete versus abstract words), and 4) experimental conditions order (i.e. individual-nominal vs nominal-individual or nominal-collaborative vs collaborative-nominal) on the global performance. Moreover, we analyzed the social interactions among the members of collaborative conditions.

3.4.2   Methods

Participants

The participants were 144 (50% female). All participants had reached the age of majority (age: M = 29.28, SD = 10.70), they were volunteers and unknown to each other. The average educational level of the sample was 14.66 years (SD = 3.95).

Procedures and Experimental Design

The research was conducted in accordance with the guidelines for the ethical treatment of human participants of the Italian Psychological Association

(i.e., AIP). All participants were recruited with the snowball sampling strategy, and signed an informed consent.

Participants were randomly assigned to one of three conditions: individual, nominal and collaborative condition, and sex and number of members in groups were balanced. The laboratory consists of two rooms: a larger room provided from two to four laptops, where the nominal and collaborative conditions were carried out, while the smaller room has been used for the individual condition.

The study was composed of two protocols divided into two sub-protocols. In the first protocol, 72 participants were involved, and half of them was first tested individually and subsequently in the condition of nominal group (pairs, triplets or quartets) (Protocol 1a: individual-nominal). By contrast, the other half of the participants were first in nominal groups (pairs, triplets or quartets) and later in the individual condition (Protocol 1b: nominal-individual).

In the second protocol, other 72 participants were involved, and half of them was first in nominal groups (couples, triplets or quartets) and later in collaborative groups (pairs, triplets or quartets) (Protocol 2a: nominal-collaborative). Vice versa, the other half of the participants were in collaborative groups (pairs, triplets or quartets) and then in nominal groups (pairs, triplets or quartets) (Protocol 2b: collaborative-nominal).

The experiment consisted of two successive sessions. In the first session, the participant had to remember a first list of words (presented for thirty seconds). Then, the participant completed a 3-minute mathematical filler task (balanced across the experiment) to prevent rehearsal in short-term memory [235]. Finally, the subject recalled the studied words by marking on a list with both studied and non-studied words, and a critical lure [297].

In the second session, all participants were together (nominal condition) and they used the virtual environment to interact with each other anonymously for 3 minutes. Then, they were asked to remember a second list of words, they completed another 3-minute mathematical filler task and, unlike the first session, each participant completed the recall task at a separate computer with the presence of all participants.

In the protocol 1b, the two successive sessions were inverted.

In the protocol 2a, the first session (nominal condition) was identical to that of Protocol 1a and 1b. In the second session, after the presentation of the second list of words and the 3-minute mathematical filler task, the par-

ticipants recalled the list in collaboration through the virtual environment, with no special instructions on how to coordinate recall, manage speaking turns, or resolve disagreements (free-for-all collaboration).

In the protocol 2b, the two successive sessions were inverted. The order of the two lists within each protocol was balanced.

Measures

Deese-Roediger-McDermott (DRM) Paradigm.   Four lists were developed from the materials of Roediger and McDermott's article [297]. More specifically, 1) the first list was the Anger 15-Word List, composed by abstract words (i.e., words about feelings); 2) the second list was the Music list, composed by concrete words (i.e., words about musical instruments); 3) the third and fourth lists were composed by a "critical lure" (i.e., Anger for the first list and Music for the second one), 10 "real words" (i.e., already read in the original list of 15 words), and 9 "false words" (i.e., not presented in the original list).

The lists produced five dependent variables: non-studied words (i.e., the sum of the critical lure and false words); studied words (i.e., real words); true negatives (i.e., false words not filled by the participants); false negatives (i.e., real words not filled by the participants); number of answers (i.e., total number of words filled by the participants).

The score of each participant was added with the score of the other members of the same group, to obtain an average score of the group performance.

3.4.3   Data Analysis

We calculated the descriptive statistics, assessing the pre-conditions required by the inferential analysis, checking the Gaussian distribution of the continuous variables (i.e. skewness and kurtosis), and the balancing and size of the sub-samples of interest (i.e., gender, experimental condition, and list type).

Then, we conducted the inferential analyses (i.e., Pearson's r correlation and Student's t-tests) to verify our aims (i.e., gender effect, group size, experimental condition order), while a MANCOVA analysis has been adopted to evaluate the connected role of experimental condition and list type on the performances.

The independent variables were the experimental condition and the type of list, the dependent variables were studied words and non-studied words,

and the education variable was introduced as covariate.

Finally, we analyzed the linguistic content of group chat in the collaborative condition through the Linguistic Inquiry Word Count computer-program (LIWC) [273, 348]. A Pearson's r correlation has been carried out to assess the relation between the LIWC dimensions and the performance scores (i.e., studied words and non-studied words).

3.4.4   Results

The analysis on the size of the group, the performance (i.e., the number of studied words, the non-studied words and the total number of answers) and the experimental condition shows that the number of members does not affect the group performance, regardless the experimental condition. Instead, the analysis on the experimental conditions order reveals that the collaborative condition shows a higher number of studied words ($t = -2.5$ $p < 0.05$; $M = 7.64$ VS $M = 8.44$), and a lower number of false negatives ($t = 2.5$ $p < 0.05$; $M = 2.36$ VS $M = 1.56$) whether the nominal condition comes first, while any other condition is significant.

Regarding the gender difference analysis on the performance (Table 3.12), females perform better than males, achieving a higher number of studied words in the total sample and, particularly, in the nominal condition. Regarding the same-gender groups and the gender majority groups, both of them show a higher number of studied words in the individual and nominal conditions, but only the same-gender groups also show a lower number of non-studied words in the collaborative condition. The same-gender groups display a higher number of studied words than the mixed-gender groups in the collaborative condition, and a higher number of total answers in both total sample and collaborative condition. Finally, the same-gender groups show a higher number of non-studied words in the nominal condition.

The MANCOVA analysis (Table 3.13) highlights an effect of the experimental condition and the type of list on the performance, for both studied words and non-studied words, as well as the interaction effect between the two factors. The performance of collaborative groups shows a greater number of studied words ($Collaborative : M = 8.29; Nominal : M = 7.61; Individual : M = 7.56$), while any significant difference is found between individual and nominal groups' number of studied words. The analysis on the type of list shows that the list A about abstract words displays more non-studied words ($A : M = 2.60; B : M = 1.84$) and less

studied words ($A : M = 7.57; B : M = 8.07$) than list B about concrete words. The analysis of the interaction between the experimental condition and the type of list shows that the experimental condition reduces the effect of the type of list on the non-studied words, while the difficulty difference between lists increases from nominal ($A : M = 2.25; B : M = 2.21$), to individual ($A : M = 2.54; B : M = 1.60$), to collaborative condition ($A : M = 2.99; B : M = 1.69$).

Finally, we analyzed the groups' virtual interactions in the collaborative condition. As we can see in Table 3.14, a greater communication and interaction in the group (i.e., LIWC variables: number of words produced, word count) and addressing the messages to all members (i.e., LIWC variables: 2nd person plural; references to other people), rather than a unique member (i.e., LIWC variables: 2nd person singular), are related to a higher number of studied words within the collaborative groups. However, the use of the 2nd person plural and a higher number of non-studied words are also associated. Finally, the use of certain words (i.e., LIWC variable: certainty) and negations in the communication is related to a lower number of non-studied words, while a clear assent in the group and the use of swear words are associated with a lower number of studied words.

3.4.5   Discussion

Adapting DRM paradigm in a virtual environment, the present research shows that collaborative facilitation may emerge and the collaborative inhibition may disappear. Collaborative groups show a higher number of studied words, confirming an effect of collaborative facilitation, whereas the similar number of non-studied words in all conditions (i.e., individual, nominal, and collaborative) suggests an absence of collaborative inhibition. Such results partially confirm the past literature [226] and they disconfirm another study [36]. Moreover, peculiar features appear in collaborative small group dynamics in virtual environments. Contrasting past literature [184], the low number of non-studied words in the collaborative groups for the list B (Concrete list) may highlight that the group's advantage of collaboration could interact with the performance in more simple tasks. In our study, when nominal condition precedes collaborative condition, the second shows a better performance. This result contradicts past studies [153, 351], and it suggests the need to better understand this dynamics with further studies.

A gender effect is also revealed in the study, as female groups exhibit a

Table 3.12: In Table, the gender differences affecting the group performance (Studied words, Non-studied words, Total responses) are reported. In particular, the t value is positive when the first mentioned group has a significantly higher mean, and viceversa. In the Table Ho. and He. indicate respectively the homogeneous and heterogeneous case, while Pr. indicates the word 'prevalence of'.

Group	Variable	t value	sig.
Males VS Females	Studied words Tot Sample	-1.971	$p < 0.05$
	Studied words Individual condition	-	n.s
	Studied words Nominal condition	-2.104	$p < 0.05$
	Non-studied words Collaborative condition	-	n.s
Ho. Male VS Ho. Females	Studied words Tot Sample	-2.496	$p < 0.05$
	Studied words Individual condition	-2.053	$p < 0.05$
	Studied words Nominal condition	-2.164	$p < 0.05$
	Non-studied words Collaborative condition	1.983	$p < 0.05$
Pr. males VS Pr. females	Studied words Tot Sample	-2.759	$p < 0.01$
	Studied words Individual condition	-2.634	$p < 0.01$
	Studied words Nominal condition	-2.413	$p < 0.05$
	Collaborative condition	-	n.s
Ho. group VS He. group	Total responses Total sample	2.096	$p < 0.05$
	Individual condition	-	n.s
	Non-studied words Nominal condition	2.008	$p < 0.05$
	Studied words Collaborative condition	2.946	$p < 0.001$
	Total responses Collaborative condition	2.389	$p < 0.05$

Table 3.13: MANCOVA on the Group Performance

Effect	Wilks' Lambda	F	Sig
Education	0.92	9.37	$p < 0.001$
Experimental condition	0.95	4.41	$p < 0.05$
Type of list	0.91	10.60	$p < 0.001$
Exp. cond. * List	0.95	2.67	$p < 0.05$

Source	Dependent V.	F	Sig
Education	Non-studied words	18.80	$p < 0.001$
Experimental condition	Studied words ($C > N/I$)	4.12	$p < 0.05$
Type of list	Non-studied words ($A > B$)	14.06	$p < 0.001$
Exp. cond. * List	Non-studied words	2.59	$p < 0.05$

In brackets the scores, from the higher to the lower. C indicates collaborative, N indicates nominal and I individual. A and B are the types of list.

Table 3.14: Correlations between LIWC Dimensions and Performance's Scores. The dimensions labelled as Studied words and Non-studied words refer to the total performance of the group, while the Average Non-studied words values refer to the total performance divided by the size of the group

LIWC Categories	Performance's Scores	Pearson's r	sig.
Word Count	Studied words	0.48	$p < 0.01$
2nd Pers. Sing.	Studied words	-0.33	$p < 0.05$
Negations	Non-studied words	-0.28	$p < 0.05$
	Average Non-studied words	-0.33	$p < 0.05$
Assent	Average Studied words	-0.35	$p < 0.01$
Certainty	Non-studied words	-0.30	$p < 0.05$
	Average Non-studied words	-0.30	$p < 0.05$
Other People	Studied words	0.34	$p < 0.05$
Swear words	Average Studied words	-0.41	$p < 0.01$
2nd Pers. Plur.	Non-studied words	0.52	$p < 0.01$
	Studied words	0.61	$p < 0.01$

lower number of non-studied words and a higher number of studied words. Since mixed-gender groups display a lower number of non-studied words in the nominal condition, it appears that the females performance improves performance of males in this group, thanks to the female individual performance that increases the outcome of the all group [242].

Finally, the analysis of the virtual interactions in the collaborative groups displays that a higher participation and a communication addressed to all members of the virtual group rather than to one individual (e.g., *What do you think, guys?*) is related to a better performance of the group. Confirming past literature [13], these results also suggest that a virtual collaboration may increase the in-group perception among members, which might be crucial for a better performance. This study, combined with the virtual interactions content analysis, may propose useful advice about collective reasoning and e-learning dynamics, which are nowadays very relevant topics in the study of web communities and educational communities.

3.4.6   Conclusions

Future research might analyze the collaboration and social dynamics in virtual groups running a complex task, comparing such a task in real environments. Moreover, we could verify the development of a sense of virtual community (SOVC) in members of a virtual group, analyzing the development of the in-group membership perception and taking into account gender, age, education and type of task. Finally, the effect of the reputation of people and the social facilitation in collaborative groups might be detected in virtual environments, investigating whether the reputation might increase or inhibit such a phenomenon.

3.5   Conclusions of the Preliminary Studies

Overall, these studies have had the general aim to provide some knowledge on how individuals behave in virtual environments such as Social Networks (e.g., Facebook) and online group chats.

First, we found that subjects within online settings share personal information and are able to efficiently collaborate in order to achieve a goal. More specifically, these findings confirm past research which suggests that also online environments are contexts in which individuals feel comfortable expressing their ideas and emotions (e.g., [87,381]), and where they can receive benefits collaborating and sharing culturally different knowledge (e.g., [280]).

Second, writing sentences with emotional charge, both positive and negative, seems to be a key strategy in online communication and self-presentation. Indeed, our results indicated that writing emotional posts may give rise to not only a higher number of received messages but also the possibility of emotional coherence in online communication, confirming previous studies [38,190,191].

Third, some gender differences are present in virtual environments such as linguistic style and empathic comments but not the presence of gender difference in messages with emotional charge. In addition, gender grouping is important, supporting the results that female groups [385] and prevalent female groups [244] seem to be two types of efficient group in the paradigm of computer-supported collaborative learning.

To sum, the results of these preliminary studies have had some implications for the implementation of the empirical studies developed in this dissertation (Chapters 4 and 5).

Based on our results of the sharing of personal information in online contexts and given that some people may feel uncomfortable talking in the presence of others about some sensitive and private issues such as IPV [185], we chose to implement the empirical studies presented in Chapters 4 and 5 through online setting, such as web-based questionnaires and synchronous online focus groups (SOFGs).

In addition, in the case of the qualitative study (Chapter 4), the assignment of participants in SOFGs followed the indications of the interesting results related to gender grouping in order to ensure a more collaborative and efficient context.

Finally, results about emotional coherence during online communication have been useful to the facilitators of SOFGs as they have been very careful to this phenomenon during group interactions.

Chapter 4

An Online Qualitative Study of Bystander Intervention of Intimate Partner Violence

In this chapter, we introduce an exploratory research aimed to describe how university students perceive two vignettes about IPV which differed in the severity level. The study sought also to understand which factors individuals consider during their choice to help a friend victim of IPV. 49 Italian university students were recruited for the study. Given that sensitive topics can be discussed more openly in online focus groups, each participant was involved in two synchronous online group chats. Within a Grounded Theory approach [132], transcripts were analyzed using Qualitative Content Analysis (QCAmap) software [230]. Our findings showed that participants report individual, relational and situational factors that affected their intent to act. Potential bystanders felt more comfortable offering help to a victim within a peer group rather than alone and having a friendship with the perpetrator increased their sense of self-confidence to directly intervene. Gender differences included male participants were more likely to intervene with risky behaviors, whereas female participants were more likely to offer protection to the victim within informal and formal social support systems. Moreover, females who knew a perpetrator were more likely to report negative reac-

tions than males. These results may have an impact on research and prevention interventions that aim to empower individuals by offering more modes in which they can intervene efficiently as bystanders. This study suggests the use of a Web format, such as online chats, in future bystander research and prevention. [1]

4.1   Introduction

The present study attempted to describe how young adults think that they may help a female friend who is victim of intimate partner violence (IPV), by means of two IPV scenarios from low to high severity.

Our study used an online environment to explore and understand bystander perceptions of IPV hypothetical scenarios utilizing a qualitative methodology. In the research field, online chats may be a promising avenue since the Internet itself is configured as a setting to communicate and socialize, and this is particularly evident in young adults who have grown up with new technologies [94]. In addition, an online setting is an effectively new way to implement the bystander approach [185].

This study has provided two vignettes about IPV which differed in the severity level not only because IPV can see as a continuum of severity and frequency [373] but also because bystanders are more likely to help in situations of IPV that they perceived as severe and problematic [84, 100].

We focused on bystander intervention for a victim who is a friend because a bystander is often someone that the victim knows [151] and because studies showed that bystanders have more likelihood to help a friend compared to a stranger [64, 180, 267]. Furthermore, as suggested by Kleinsasser and colleagues [185], helping a victim of IPV who is known to the bystander, such as a friend, might be more realistic for a brief online discussion.

In accord with Banyard's [27] review, to better understand the main factors that may promote or discourage a helpful bystander intervention, we used a socio-ecological IPV bystander intervention model, which couples Latané and Darley's model [202] with Bronfenbrenner's [58] ecological model.

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[1]A preliminary version of the work presented in this chapter has been published as E. Guidi, B. P. H. Mandelbaum, N. Bosco, A. Guazzini, P. Meringolo. "How can Bystander Intervention change?: An Online Qualitative Study in Italy and Brazil", in C. Pracana, M. Wang (Eds.) *Proc. of International Psychological Applications Conference and Trends*, Lisbon (Portugal), 2016. [ISBN: $978 - 989 - 99389 - 6 - 0$] [147].

Gender is an individual variable that appears important for understanding bystander intervention [27]. For example, Banyard [26] and McMahon [232] found that females report more levels of bystander behaviors. Moreover, males had a higher likelihood to direct interventions while females were more likely to indirect interventions [267]. Chabot and colleagues [84] found that male and females bystanders differ in the less severe IPV case with men more likely to be involved in risky behavior (e.g., get physically involved, or talk directly to the aggressor) than females but there is not gender difference in a hypothetical more severe IPV scenario.

Other individual factors that may increase the individual's willingness to intervene as a bystander in the IPV situations are the indirect or direct experiences of violence during childhood such as witness of IPV in the family context [40] and child abuse [84].

An unexplored individual factor which may influence bystander intervention is a direct experience of IPV such as a prior history of perpetration and victimization [380]. Among university students, IPV is a significant problem [210, 217] and often the phenomenon is bidirectional [122] although the injuries can be different between genders [341]. In their recent study, Woods and colleagues [380] found that university students, especially female participants, with prior victimization experiences of physical IPV and sexual violence or with past perpetration histories of physical IPV were more likely to be involved in bystander intervention than non-victims and non-perpetrators.

Also, an indirect experience of IPV or sexual violence such as knowing someone who had been a victim of these problems is an individual factor that may contribute to understanding the bystander intervention. For instance, a study about bystander intervention to rape prevention found that college students who knew a victim of sexual assault showed more bystander's positive attitudes [232]. However, another study indicated that men who knew someone who was abused showed less intention to intervene after a bystander training about IPV, supposing that knowing the negative consequences of IPV might decrease the self-efficacy to deal with this issue [234].

As situational factors, this study wants to describe how bystanders' actions could change in relation to the presence of other people (e.g., peers group). Some studies highlighted that increasing the group size of bystanders may increase or decrease bystander intervention [214]. For instance, when a bystander is with friends, increasing group size may encourage readiness to

intervene [214].

An important relational factor is the bond between bystander and perpetrator, and this study tries to explore the influence of friendship with the aggressor on bystander intervention. Some studies showed that having a friendship with the aggressor is associated with more willingness to intervene [64, 267] whereas another study found that bystander may feel safer to intervene but also less likely to perceive the situation as being problematic [44]. Burn [64] also showed that males have more likelihood to help an aggressor who is a friend than females.

Finally, since little is known about the community and societal factors [27], this studies described the broad public beliefs of IPV causes and IPV prevent strategies. For instance, an exploratory research that examined differences in understanding of sexual violence between expert and general individuals found that individuals' speeches are missing some aspects of the issue of sexual violence, and this finding may have suggestions for communication strategies within bystander approach research [263].

4.1.1   Aims of the Research

The general aim of this study was to explore how university students perceived two vignettes about IPV which differed in the severity level as well as it tried to describe which factors people considered during their choice to help a friend victim of IPV.

Specifically, following the socio-ecological IPV bystander intervention, the aims of this study were to develop a theory, based on Grounded Theory approach [132], of the processes involved in bystander interventions from the perspectives of young adults, centralizing the role of the peer group and the friendship with the aggressor, and exploring possible gender differences.

4.2   Methods

4.2.1   Participants

Participants were 49 students (71% females; M = 22.79, SD = 2.77) recruited from community psychology classes in an Italian university and who received extra credit in their course for participating. Students were informed that confidentiality was guaranteed.

Table 4.1: Descriptive Information of Study Participants

	No %	Yes %
Direct experience of IPV		
Being in an abusive relationship	75.3%	24.7%
Indirect experience of IPV		
Knowledge of an IPV episode	75.0%	25.0%
First-hand observation of IPV	47.9%	52.1%
Childhood direct experience of violence		
Victim of abuse/negligence	93.7%	6.3%
Childhood indirect experience of violence		
Witness of IPV in the family	81.2%	18.8%

A total of 64.4% of the participants were in a romantic relationship, 18.9% were single and 16.7% had never had a boyfriend/girlfriend during their life.

As shown in Table 4.1, 24.7% of the respondents had been victim or aggressor of IPV. As indirect experience of IPV, 25% of participants knowing someone who is in an abusive relationship and 52.1% of the sample sees an episode of IPV. Finally, 6.3% of participants had been victim of abuse and/or negligence during childhood while 18.8% was witness of IPV in the family.

4.2.2 Procedures

Two vignettes were elaborated and they described two IPV episodes in which participants witnessed one hypothetical scenario of less severe violence and another of more severe violence perpetrated by a male toward a female friend.

Studies focused on bystander intervention often applied vignettes as an instrument to manipulate variables (e.g., [44, 180, 267]). In this exploratory study, the semi-structured questions of each vignette allow to manipulate key features of the situation (i.e., the presence of a peers group) and the relationship between the bystander and the perpetrator (i.e., an abuser as a friend).

Participants were involved in two synchronous online focus group (SOFGs): 8 for the first vignette and 7 for the second one (a total of 15 SOFGs), which lasted 60-90 minutes each. Given that students may be uncomfortable discussing a sensitive subject, such as IPV, in the presence of others [185], we chose SOFGs in order to address this problem.

Comparing traditional face-to-face groups (FTFGs) with SOFGs, a study

showed that SOFGs may produce more ideas and concise communications than FTFGs [290]. The study also found that there was not a difference between the preference of this two types of focus groups, but the motivation for SOFGs preferences was anonymity which brings less inhibition and intimidation and more openness in the speeches [290]. Another study showed that SOFGs where individuals can see each other produce more intragroup conflict, reinforcing by facial expression or laughter [356]. A recent study, involving gay and bisexual men talking about IPV, found that SOFGs giving anonymity and confidentiality allows more openly discussions of sensitive topics [381]. Thus, sensitive topics can be discussed more fully in the SOFG [381] and, since the attractiveness of the Internet as a communication instrument for the new generation, SOFG might be an effective technique of engaging this target in research [125].

Following the interesting results about gender grouping (see section 3.5), participants were randomly assigned to the SOFGs, starting first from the potential list of the female participants and later from the potential list of male participants in order to build mixed groups with more females. In the first SOFGs, a vignette describing a low severity episode of IPV was presented to the participants, while in the second SOFGs participants discussed a vignette depicting a high severity episode of IPV.

At the beginning of each SOFG, a trained facilitator described the nature of the group discussion, elucidated group rules, and explained how confidentiality would be maintained.

Upon consent and before starting the first SOFG, each participant completed an online questionnaire. Socio-demographic information was demanded (e.g., gender, age). Moreover, we asked relational variables such as relational status, and, similar to Chabot and colleagues [84], a series of dichotomous items (0 = No; 1 = Yes) were demanded to assess participants' experiences of direct IPV relationship, indirect IPV during adulthood, and direct and indirect childhood traumatic events about violence. After, a vignette was presented in the online chat, following the classic model of bystander behavior [202] participants were asked: a) how they interpreted the event, b) what are the expectations of their friend in relation to their behavior, c) what would be the best intervention, and d) what were the risks or the benefits of their intervention, and how to overcome the identified risks. Moreover, using a socio-ecological IPV bystander intervention framework, we questioned: e) how would participants' perceptions of the event change

if they were with a peers group, and f) if they were friends with the aggressor, and finally, g) which are the main causes of IPV are and how they can prevent it.

At the end of SOFGs, participants were debriefed and provided with a list of resources about IPV with its services contacts (e.g., telephone, e-mail, etc.).

4.2.3 Data Analysis

The aim of this study was to develop an interpretive theory on how bystander intervention could be influenced by not only individual factors but also by relational, community and societal factors.

In this study, Grounded Theory (GT) approach [132] was used. GT is a research methodology for developing "theory"[2] that is grounded in data systematically obtained by research participants [132]. As opposed to quantitative methods where theory development is usually done before collecting and analyzing data, GT is characterized by developing theories connected to the current data collection and the analysis process [239].

In GT approach [342, 343], the data analysis involves three levels of coding: 1) open coding, where the researcher divides data into preliminary codes, 2) axial coding, where the researcher brings together these codes into concepts that are connected with categories, and 3) selective coding, where the researcher organizes and integrates the categories in order to create relational statements that are used to build the theory of the study.

Transcripts of SOFGs were entered into the open access web qualitative software program Qualitative Content Analysis (QCAmap), that allows to independently read, code and compare the categories [230].

In the present study, three researchers coded the transcripts independently to achieve better inter-judge reliability. In the coding process, each code had specified if the content was expressed by a male or female participant and if the code was related to the first vignette or the second one. After the coding process, we revised the coding to achieve optimal reliability. Moreover, we built conceptual areas in order to present the findings. Finally, to preserve the anonymity of the participants, each participant was assigned a number, specifying gender (e.g., 1M, 2M, 3M, ..., 1F, 2F, 3F, etc.).

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[2]In this theoretical background, theory means conceptual map resulting from the all data analysis.

4.3 Findings

Findings illustrated the following grounded theoretical relationship: individual, situational and relational factors influence bystander interventions in both hypothetical IPV scenarios. In other words, participants reported different actions when a bystander is alone, within a peers group or bystander is a friend of the aggressor (see Fig. 4.1). In all, 635 codes emerged from the qualitative analysis of the online focus group transcripts. These codes were grouped into categories, main categories and areas, which are described below, and each area was explored taking into consideration possible gender differences.
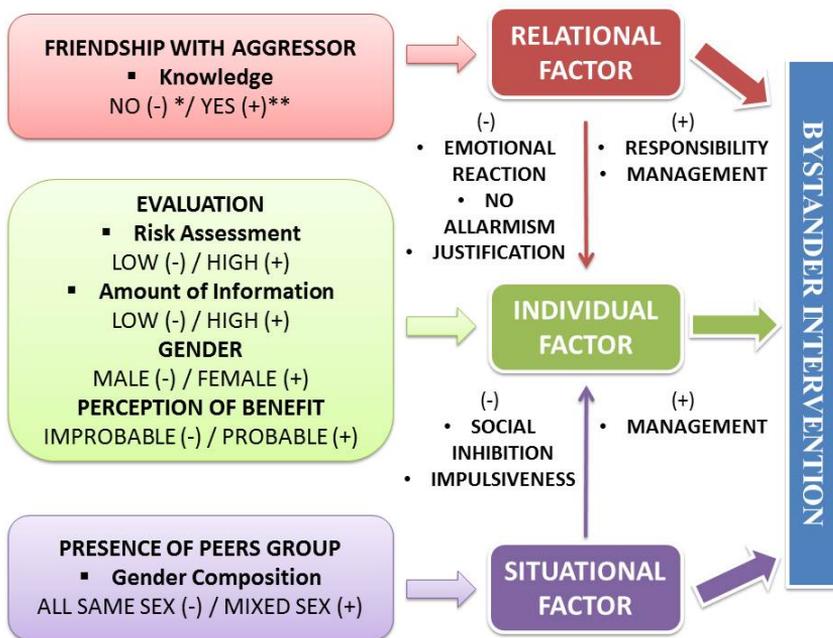
Figure 4.1: Emerging Theory about the Interrelated Set of Individual, Relational and Situational Factors that Influence Bystander Intervention.
Legend:*(−) means a negative influence that decreases the possibility of implementing a helpful bystander intervention.**(+) means a positive influence that increases the possibility of implementing a helpful bystander intervention.

4.3.1 First Area: Bystander Interpretation of the IPV Episode as a Problem

a. First Chat

Following content analysis, 45 codes emerged which described participants' interpretation of IPV first scenario. Codes were divided into four main categories: victim's behaviors, aggressor's behaviors, couple dynamics, and bystander's judgments.

The main category of victim's behaviors was expressed by only female participants (e.g., 5 codes). They recognized the girl's difficulty of leaving the relationship because of the fear of being alone or for the boyfriend's reaction, supposing that the victim still feels love for her boyfriend. For example, 24F said: *"Unfortunately in an unhealthy relationship people try to save only the positive aspects, hiding what causes suffering such as fear of losing the partner or his possible reaction"*. They also thought that the girl felt very alone. Female participants stated that the disclosure of abuse relationship to a friend happened because the violent episode occurred in a public environment, and they recognized the disclosure as a sign of victim's help-seeking behavior.

The main category of aggressor's behaviors was the core category with 21 codes. Both male and female participants pointed out the negative behaviors of the boyfriend such as humiliation of the girlfriend, extreme control, aggressive behavior, and lack of trust. Female participants indicated other not-positive behaviors like jealousy, insecurity, fear of losing the girlfriend, and not respect of couple privacy. They recognized the presence of violence in boyfriend's behavior such as verbal and psychological violence and they were worried about the recurrence of violent behavior.

Finally, both male and female participants highlighted that boyfriend's behavior may be driving by anger, making his excessive reaction not-controllable. For instance, 32F mentioned: *"It was an episode of high anger that made one reacts in that way"*.

Seven codes described the main category couple dynamics. Participants stated that the couple was characterized by lack of dialogue/negotiation (*"It strikes me that they, as a couple, do not take into account the idea that they must negotiate a way of being together that works for both of them, before degenerating everything"* 11M) and a not suitable way of discussion between the members of the couple (*"Discussion which could be a moment of healthy*

debate becomes a way to overpower the partner and vent aggression against her" 29F). Some male participants thought that the relationship is very problematic. One male student was struck by the discussion took place in public place and another participant highlighted the presence in the couple of gender difference in the violent behavior acted by both members of the couple: *"Based on my experience too, I recognize that the male component of violence is the kick to the door, while the female component of violence is associated with the verbal humiliation"* (14M).

The last main category of this area was bystander's judgments which was described by 12 codes that may be grouped in three categories: judgments about girl's behaviors, judgments about boy's behaviors, and evaluation of the episode. Some participants especially males thought that the girl had an inappropriate behavior as a girlfriend (*"I would not want to play devil's advocate, but she puts in place some behaviors that might make suspect you a betrayal"* 10M). Two male participants expressed some judgments that may justify the boyfriend's behaviors (*"Considering that he was not entirely wrong, she was knowing other guys [. . .] I would go to the party especially if my girlfriend did not answer to the cellular all night long [. . .] at the end he just slammed the door [. . .] wrong reaction but it was a natural reaction"*) 5M; *"I would not condemn. There are different personalities and each one has his flaw and way to blow off steam. Until one does not infringe the freedom of others and not use violence against others, one can do what he wants"* 14M). However, one male participant and some female participants did not tolerate the boyfriend's behaviors (*"He could deal with these feelings in a different way from anger as well as physical aggression"* 4M; *"I do not agree!!! It is the same logic of those who say that rapes against women are justified by the fact that they dress in a provocative way"* 20F). Some participants evaluated the scenario as a common episode in their experience, bringing them not to be impressed by the event presented. Two female participants recognized the lack of knowledge about the relationship.

b. Second Chat

Participants recognized the seriousness of the episode presented, indeed content analysis revealed 22 codes underlining this element. Codes were divided into two main categories: abuser's use of violence and victim's reaction to the violence.

Identification of the abuser's violent behavior was the core category with

17 codes. The code "physical violence" emerged as the most evident sign of the problem, as exemplified by 8F: *"Here we are talking about a real episode of physical violence. This is a real big problem!"*. Moreover, participants pointed out that the scenario was characterized by a high rate of violence: *"I was struck by the fact that he uses his hands on her and he is so oppressive towards her because within a relationship respect and trust must be present"* (23F). A female participant believed that an element of severity was in part due to the fact that the episode of violence took place in a public space. Then, other aggressor's behaviors captured the attention of participants, such as control, jealousy, psychological violence, anger, and lack of empathy.

Regarding the victim's reaction to the violence, few bystanders of both genders recognized the victim's mixed emotions of fear and love for the abuser (*"It is not clear if she is afraid to leave him because she could then suffer more violent aggression or because the love for her boyfriend is bigger than her fears"* 7F), and few female participants also saw the victim as being disempowered (*"Among problematic elements there is her silence about certain previous episodes"* 1F; *"Although she already knows her violence she cannot do anything to solve it"* 15F).

4.3.2   Second Area: Bystander Sense of Responsibility to Intervene

a. First Chat

Bystander sense of responsibility to intervene was described by 24 codes which were divided into two main categories: advice and support.

Participants believed that the girl would expect advice on how to handle the situation, in particular, how to leave or stay away from him. However, they thought that advice may not be effective (*"Advice are often "heard and not listened" because the situation is perceived differently when one lives it than when one just observes it from the outside"* 28F), so it is important to let the girl decides about her emotional situation (*"Surely I could only give my point of view, trying to open her eyes, but the final decision is up to her, it should come from her"* 6M).

Participants also hypothesized that the girl would receive support from them such as emotional support (e.g., listening, vent, etc.) and informative support (e.g., help to solve the problem, increase awareness of IPV). However, few females highlighted that the girl would also need some forms of

instrumental support, involving other individuals or services: *"Why not a concrete help? I would have hosted the girl, if she made the decision to move away from the violent partner, to get away as possible from the unhealthy relationship. Or, if she showed bruises or marks on the body, I'd take her for a medical examination to make a check and understand that there is no more physical damage"* (27F).

b. Second Chat

Following content analysis, 16 codes emerged which described participants' sense of responsibility when confronted with an episode of IPV.

First, participants perceived the necessity to intervene in this situation out of fear of the repercussions associated to inaction: *"However, if I don't take action I'll feel anxious. I exclude ignoring the situation, I don't see it as a plausible choice"* (14M). In particular, participants stated that they felt responsible for intervening through direct actions, such as giving emotional support to the victim: *"The victim's behaviors lead me to believe that she is really exhausted by the situation... in some way she is asking me for help. So I would give my attention to my friend, hug her, try to console her and listen to what happened"* (6M).

Participants also expressed the need to provide support for managing the situation through formal or informal services. With regard to gender differences, only female bystanders recognized the need to offer information on what a violent relation is and the importance of ensuring the safety of the victim.

4.3.3   Third Area: Bystander Decisions on How to Act

a. First Chat

A total of 51 codes described the bystander decision on how to act during and after the first hypothetical IPV scenario. Participants proposed to deal with this situation mainly through direct strategies (see Fig. 4.2).

One common strategy was giving support to the victim especially emotional support. For instance, 8M mentioned: *"I probably would not resist to the temptation to hug her or take her hand, bringing her to a quieter place or at her home"*. Moreover, 11F stated: *"Listen, keep company to her because she does not feel lonely... in the following days contacting her and meet her for spending time together"*.
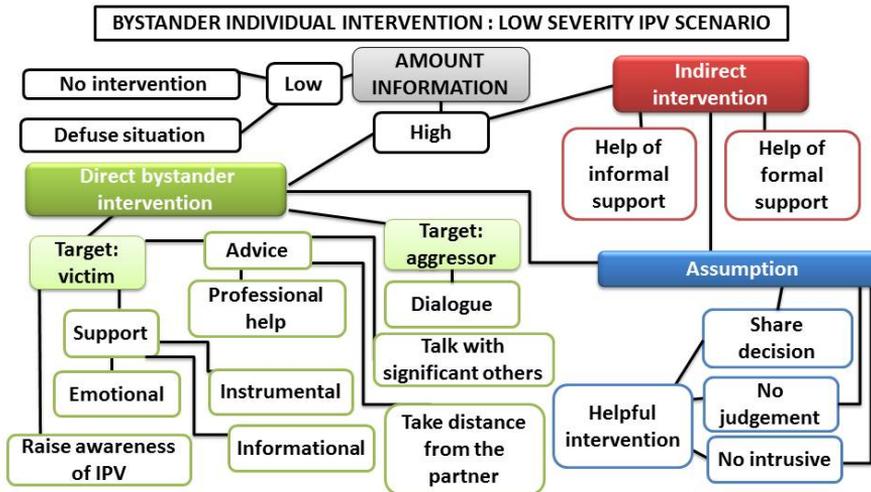
Figure 4.2: Code Tree: Bystander Individual Intervention (Low Severity IPV Scenario).

Participants proposed to give also informational support (e.g., help in problem solving, strategies to protect herself), and advice (e.g., consulting a professional such as a psychologist, talking about the issue with significant others such as family, avoiding to meet the aggressor). Some female and one male participants proposed to make the victim aware of the violent nature of the relationship: *"I would try to open the eyes of her, to make her understand that a relationship of this nature is unhealthy."* (26F). While males did not propose to provide instrumental support, females pointed out the importance to give this kind of support especially after the violent episode: *"On the spot I would accompany my friend at home or, if possible I would host her directly to my home"* (8F). One male bystander declared *"I would not do anything on the spot"* (7M) while another proposed the strategy to defuse the situation. Conversely, two males were supposed to speak also with the boyfriend: *"I would tell him of calming down"* (4M).

Only female students proposed indirect interventions as strategies to cope the violent episode, asking for help to both the informal (e.g., friends) and formal network (e.g., psychologists): *"I would ask someone who is close to me to help me ... I do not think I could well handle the situation in an autonomous way"* (29F).

Some participants identified a number of assumptions that are the basis of a good intervention: let the victim taking the decision (*"Let her free to think for herself"* 14F), do not be too intrusive (*"I would avoid to "tackle" in other people's relationships"* 12M), and avoid judging (*"Not necessarily he is the monster, or she is the woman of easy virtue. I would wait before coming to hasty conclusions"* 14M). While some participants expressed also the need to have more information about the relationship and its issues before intervening: *"I would try to understand what really does not go without take the defense of one of them, in order to be able to recommend what I think is the best for her"* (7F).

b. Second Chat
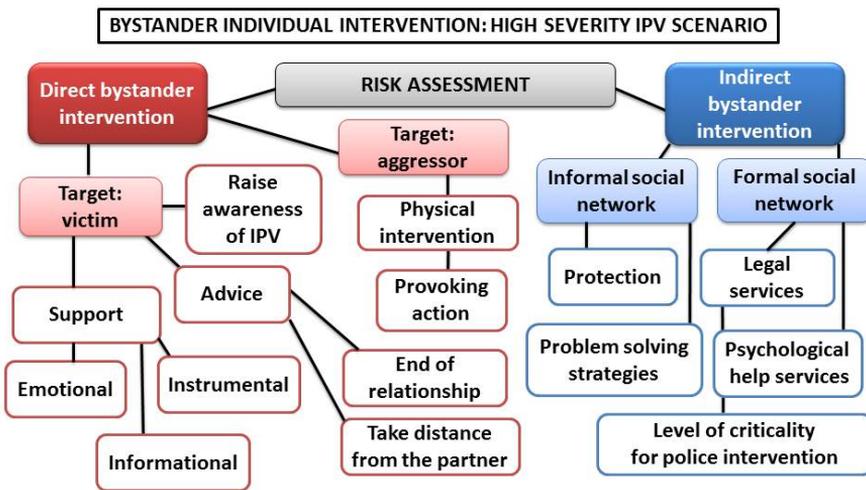
Figure 4.3: Code Tree: Bystander Individual Intervention (High Severity IPV Scenario).

Bystander decisions on how to take action were described by 54 codes (see Fig. 4.3). Individuals stated that taking action was preceded by an evaluation of the severity of the IPV event: *"We should think before intervening if a situation is too dangerous... even in an emergency, one's own security is the first thing to consider, otherwise you don't end up saving anyone! So it's important to evaluate if we should directly intervene or call the police"* (4F).

Participants highlighted that there were two main strategies to cope with an IPV event: direct or indirect interventions, which both focus on the victim or the aggressor.

Regarding direct actions toward the victim, males and females stated the same actions, which were mainly characterized by support (i.e. emotional, instrumental and informational support), making the victim aware of the violent nature of the relationship, and offering advice (i.e. taking distance from the aggressor or putting an end to the relationship).

Regarding direct actions focused on the aggressor, proposed actions were found to differ by gender. Male bystanders tended to opt for physical and provoking actions, that may not necessarily result in a positive help-giving strategy to victims of IPV: *"I admit that I would impulsively go directly to the aggressor because of the anger that I would feel seeing my friend mistreated... even if I didn't know what to do or what to say, and running the risk of being harmed!"* (6M). Conversely, female bystanders did not propose any strategies aimed at directly facing the aggressor, as they underlined how ineffective their direct action against a stranger aggressor could be: *"Without knowing the aggressor, it seems strange or inappropriate to intervene towards him because I only see that as worsening the situation by talking to him"* (14F).

With regard to indirect actions, female participants felt the need to form an informal support network to ensure protection for the victim (*"After, I would try to not lose contact with her and suggest that she discloses what happened to her parents, friends or other significant adults. I would try to create a safe support network"* 10F), and to provide additional bystander problem-solving strategies to deal with IPV (*"After the event, I would ask other people for advice, in particular, other significant adults that have more competencies than me. They can give me advice about how I should act in this type of situation and to contact police and specific services for battered women"* 27F). As for male participants, they did not propose informal support networks as a possible strategy. Indeed, 14M argued: *"I wouldn't inform her parents. I would probably never say anything to them. Not because I don't agree with you girls... just because instinctively I wouldn't do that!"*.

That said, both female and male participants thought that it may be useful to activate a formal support network. They mostly talked about legal services (i.e. reporting to the police) and a minority of participants believed in the potential of psychological help services for victims and aggressors.

However, some participants did not think that reporting to the police was a good solution: *"I think that a police report may not change the aggressor's behavior, but rather it can increase a negative and violent situation"* (13M).

4.3.4   Fourth Area: Bystander Perception of Costs and Benefits and Risk Avoidance Strategies

a. First Chat

Our findings showed 25 codes about the bystander perception of costs associated with bystander intervention.

A first cost that was indicated by the participants is the increase of violence against the girl (*"So far he has kept his anger, with our intervention he might react very badly especially against her"* 24F). According to the participants, for intrusion in a relationship a bystander could receive threats from the aggressor (*"He may even use violence on me because maybe he can't stand that I interfered in his situation"* 12F).

A second cost expressed more by females than by males was the loss of friendship and trust due to excessive initiative and intrusiveness of the bystander in the love life of the friend (*"Our intervention may be seen as intrusive and it could then push our friend to move away from us and close again in herself"* 28F), highlighting that the bystander intervention may be unhelpful. For instance, 14F said: *"Unfortunately I do not know if a friend actually knows what to do in certain situations. I had friends in worse situations and I assure you that I have always worsened the situation by acting like you are proposing"*.

Finally, three participants declared that there were not risks correlated with bystander intervention.

Participants described how to deal with these risks by means of 20 codes. Two females recognized the importance to cope these costs, even if one does not know how to overcome them: *"I honestly do not know how to avoid the boy's anger, but not for this I would back down from the situation. I'd assume some risks rather than leaving my friend alone knowing she was in danger"* (1F).

Few participants, more females than males, have proposed direct or indirect interventions that can help to overcome the risks due to the bystander intervention.

As direct intervention to avoid an increasing of violence against the girl,

three females indicated of giving advice about personal safety (*"I would recommend her to move rarely alone"* 10F) while three males reported to monitor the situation (*"These risks can be overcome by monitoring"* 8M). One male and three females also indicated of speaking with aggressor as a strategy to cope the costs (*"It could be avoided also talking to him about the situation that has arisen"* 2M).

As direct intervention to prevent conflict between a bystander and a friend victim of IPV, three female participants highlighted of avoiding a leader's behaviors maintaining the decision on the friend's control: *"It's her choice, support is given according to what she is willing to do, no one has to do actions for her"* (30F). Other two females recommended to win the trust of the victim by means of support: *"Try to win the trust of the girl, letting her know that we are on her side"* (28F).

Among indirect interventions, one male and some females thought that it may be useful to inform informal network members such as the family and the friends of bystander or victim. Indeed, 9F argued: *"If the situation gets worse, I would try to convince my friend to inform first the parents and people close to her and me, so that there is awareness of the situation and others can also notice the "red flags" when occur. Surely this would help my friend to not feel alone if there were the needs of taking the decision to denounce her boyfriend for violence"*.

Only three female bystanders talked about activating formal network services as professional ones (e.g., psychologist, self-help group) or police.

A total of 15 codes is associated with the perceived benefits of a bystander intervention. Some participants reported as a perceived benefit the presence of more support for the victim that increases not only her protection (*"The intervention would help my friend to feel more protect"* 6M) but also it decreases her sense of loneliness (*"Surely even the simple fact that she sees external support it makes her feel less alone in this situation"* 4M).

Another perceived benefit indicated by two females and some males was stopping or reducing the violence (*"One benefit is to end the verbal violence which could lead to others in long term"* 27F), and not seeing the friend suffers anymore (*"Benefit is also don't see a friend cries at a party"* 8M). One male spoke about an increasing of psychological well-being, and three females reported a returning to independence. Finally, some females also thought about an increasing of awareness about healthy relationship and IPV in the victim (*"One of the benefits is to activate friend's awareness on*

how many negative consequences could result from such type of relationship and to make her understand that normal relations SHOULD NOT develop with these modes" 27F) and abuser (*"He may not be aware of how to live a healthy relationship, for various reasons, so our intervention could re-size his vision in better"* 24F).

However, benefits were seen as improbable especially if they come from informal social networks: *"I also have a friend that despite the evident humiliation by her boyfriend continues to carry on the relationship regardless of friends' opinions"* (12M).

Moreover, some participants identified some requirements that may bring to benefits such as shared decisions, trust, and no hesitancy of the victim.

b. Second Chat

In the SOFGs, 12 codes emerged relating to the possible costs associated with bystander intervention. In particular, participants highlighted two main negative consequences following a bystander intervention: (a) the potential increase of violence toward the victim or the bystander, and (b) the loss of friendship. However, certain participants recognized that bystander intervention could not be helpful in some cases: *"Our actions could have no effect! In this case, I would directly interfere in the situation, even if there are some risks. I say this from personal experience"* (10M).

To avoid these potential risks, participants proposed 28 codes. To prevent a conflict between a victim of IPV and a bystander who are friends, participants recognized the importance of not imposing their point of view and respecting their friend's right to make her own decisions. Moreover, female bystanders identified the need to continue offering emotional support to their friend: *"I would be close to my friend, no matter the possible conflict with her... this could make her understand that we could resolve the situation together"* (24F).

To avoid potential violent reactions from the aggressor, participants mentioned both direct and indirect strategies.

As direct actions, bystanders proposed to increase their instrumental support in order to create a safety barrier between the victim and the aggressor and also proposed to avoid acting impulsively with the aggressor by *"keeping calm"* (4M).

As indirect actions, participants reported that they would put in place formal and informal social safety networks. Cited formal support strate-

gies were more similar between males and females than informal strategies. Namely, they proposed to put the victim in contact with local community resources (e.g., police, battered women services and other professionals) that could give her information and support. For example, 30F mentioned: *"To overcome these risks, I would seek help by calling experts in the field of violence in order to respond appropriately to the situation and act in a conscious, cautious way"*, and 3M said: *"Since I'm not an expert, I would ask help from an anti-violence center or any other associations that deal with this kind of problem in order to better manage the situation"*.

A total of 27 codes described the perceived benefits associated with bystander intervention. In general, participants highlighted benefits that affected the victim, the aggressor, and the bystander.

In regards to victim benefits, participants underlined how their interventions could help make the victim aware that she is in a violent relationship and inform her of available resources (*"My friend could have access to different types of support and could enter into a safe environment that would help her"* 4F). Moreover, they thought that their intervention could interrupt the cycle of violence and make it possible for their friend to become more empowered and improve their well-being (*"My friend could gain serenity, self-esteem, and empowerment. It would be a progressive recovery, but she could start a new healthy relationship that would emancipate her"* 8F).

Perceived benefits regarding the intervention toward the abuser included helping him become aware of his violent behavior: *"By intervening, the aggressor could have the opportunity to think about his attitudes and reflect on his own actions"* (4M).

In terms of perceived bystander benefits, participants disclosed that they could feel a sense of gratification from helping a friend: *"I would be proud of myself because I helped a friend in a difficult situation and thwarted danger"* (1M).

4.3.5 Fifth Area: Influence of Peers Group on Bystander Intervention

a. First Chat

A total of 32 codes described the influence of peers group on bystander behavior. In general, the participants believed the intervention in the group as more effective (15 codes) than ineffective (10 codes) (see Fig. 4.4).
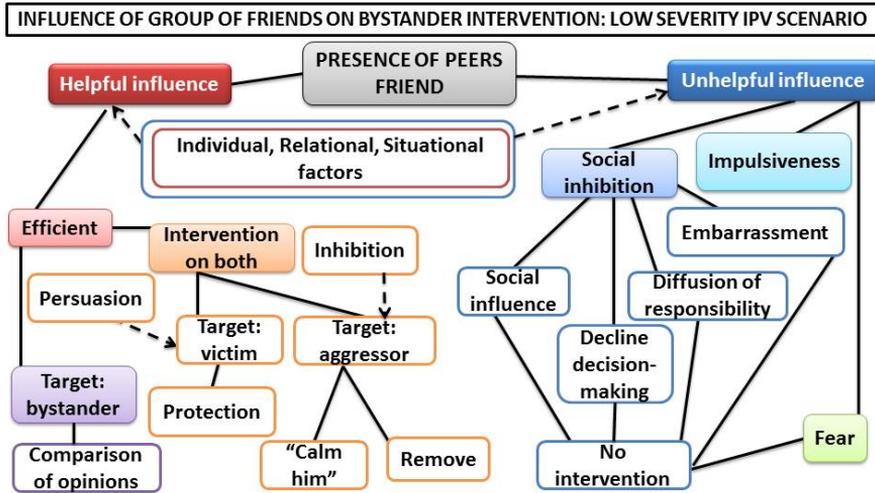
Figure 4.4: Code Tree: Influence of Peers Group on Bystander Intervention (Low Severity IPV Scenario).

Participants indicated that the group intervention is more effective than individual bystander intervention because it allows to intervene on both the victim and the aggressor during the episode (*"I think in the same way... my friends would intervene before to succor her, and if he's stayed around, they would try to understand his position"* 4M) that later (*"We could arrange to help our friend if she wanted, one could send her a short message, another could ask her if she wants to have a coffee, another could call her boyfriend and ask him what's come over him. I think we could create a stronger support network"* 16F).

As regards the victim, the group intervention is more effective because it is more persuasive (*"Surely creating a group voice that says the same thing to my friend, it would take her to think a little more about it"* 20F), but it also guarantees greater protection (*"She may also feel more secure if she knows that she can rely on a group of people instead of just one"* 10M).

As regards the aggressor, the group intervention can inhibit the abuser's violent actions (*"If the boy felt in the minority surely he would be more prudent about behaving badly"* 7M), and calm and throw him out (*"Probably friends would try to calm down and move away to avoid creating even more embarrassing situations"* 26F).

The group also is perceived as a resource for the single bystander because it allows a comparison of opinions (*"The comparison with others could lead to come out best solutions"* 30F).

However, according to participants, the group can lead to not take action during an episode IPV due to the diffusion of responsibility (*"Maybe I would thought more to amuse me, obviously making a mistake. I think you act less within a group, you are inhibited"* 1M) and embarrassment (*"Experiencing among friends the scene would cause more embarrassment than a defense behavior towards the girl"* 13M).

Moreover, two females thought that the non-intervention in the group context may be due to processes of social influence (*"I could be influenced by the behavior of other present friends"* 25F) while one female indicated the fear of negative consequences.

Few female participants believed that increasing the number of bystanders could bring a decline of decision making (*"But with too many people there is a risk that everyone wants to say what they think and in the end it did not help our friend! We end up getting lost in our reasoning"* 17F).

Being in a group can lead bystanders to act impetuously, worsening the situation: *"Perhaps if there were other friends, they would intervene at the time of the scene, and I do not know if this would have led to worsening the situation"* (26F).

According to few female participants, some individual factors (e.g., *"Men and women react in a totally different way and the personality goes to influence the reactions in front of scenes of this type"* 27F), relational factors and situational factors (e.g., *"It depends on the degree of confidence and the gravity of the discussion"* 25F) may affect the efficacy of group intervention. About gender differences in a group context, some females highlighted that male friends would address to the aggressor. However, few participants pointed out that they would not be influenced by the features of the group: *"I think that being with friends would not change the way I act"* (13M).

b. Second Chat

Content analysis derived 29 codes describing the group's effect on bystander intervention. Groups were believed to have both helpful or unhelpful influences (see Fig. 4.5).

As helpful interventions, participants recognized the possibility of a group's direct actions. For example, 8F reported her own experience as
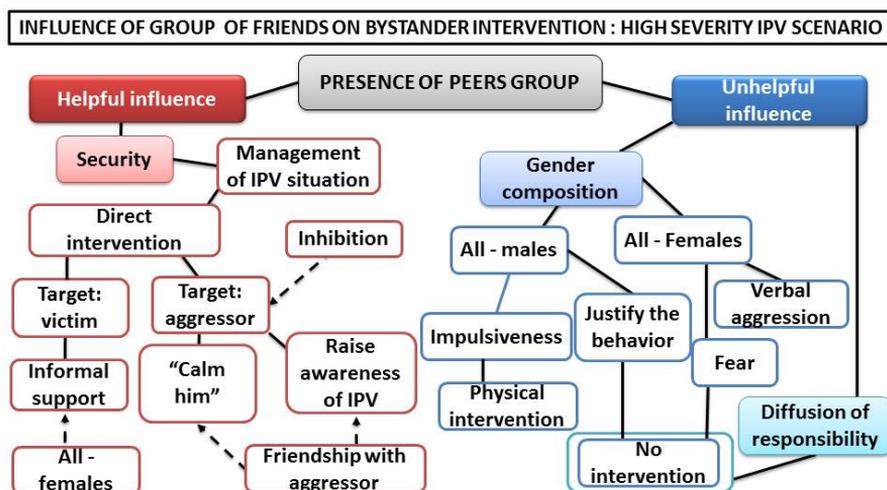
Figure 4.5: Code Tree: Influence of Peers Group on Bystander Intervention (High Severity IPV Scenario).

a bystander: *"A friend of mine had a similar experience. My friends and I gave her advice and a shoulder to cry on... First, we intervened verbally and then we contacted her parents, one of whom is a lawyer"*.

Participants thought that the group could also inhibit the abuser's aggressive behavior, as 11F mentioned: *"Perhaps the aggressor's behavior could be different in front of a group of people... he could be intimidated"*.

In addition, participants stated that a group of witnesses could help manage the situation of IPV and extend support to the victim: *"Some members of the group could stay with our friend in order to support her and make her understand that she is not alone"* (6M), especially if there is an all-female group.

Female participants had more ideas about the effects of the group on bystander intervention. For them, being in a peers group allowed them to easily and effectively intervene in the situation, because the bystander could feel a greater sense of security: *"With more people it is easier to help a friend and we can better control the situation in order to avoid another violent episode"* (6F). Furthermore, the presence of a group who are friends with the abuser could help attenuate the IPV situation by calming him down, and raising awareness of his violent behavior: *"If there are also aggressor's friends*

these could help him to reason and understand that this is an aggressive behavior" (6F).

Regarding unhelpful interventions, participants believed that sometimes in a group context, people more hastily choose physical altercation as a mode of intervention: *"I'm sure that my friends would start a real manhunt... not to be superheroes, but because in front of an evident situation of violence they wouldn't restrain themselves"* (6M).

It was also mentioned that the presence of others in an IPV situation might increase a diffusion of responsibility: *"Maybe with more people, someone that is not really close to the victim could think that someone else would help her. I mean... let someone else resolves the problem"* (34F).

Participants underlined how the gender composition of the group could influence the bystander intervention. They affirmed that an all-male group could be more impulsive with the aggressor and lead to assaulting him physically: *"I think that the main reaction of a group of men confronted with a situation of violence against a woman is to fight. I know that is a childish reaction, but it is like this"* (8M). One female also stated that an all-male group may justify the friend's aggressive behavior: *"The men would take not the defenses... but they would tend to diminish the impact of the boy's behavior"* (20F). On the other hand, female participants underlined that an all-female group could fear the abuser's reaction and focus more on protecting the victim: *"Due to fear, females wouldn't assault the abuser. Instead, they would prefer protecting the victim"* (35F). Moreover, two females participants reported that at least an all-female group could act a verbal aggression towards the abuser: *"All females is easier than they attack him screaming rather than use more forceful methods"* (31F).

4.3.6 Sixth Area: Influence of Friendship with the Aggressor on Intervention

a. First Chat

Our findings showed 28 codes describing this area. As shown in Fig. 4.6, the friendship with the perpetrator could increase the willingness to help for male and female bystanders because they thought that they may better manage the situation because they have more knowledge about him (*"Also I think it allows me to better manage the situation because I would know better as he usually behaves"* 34F).
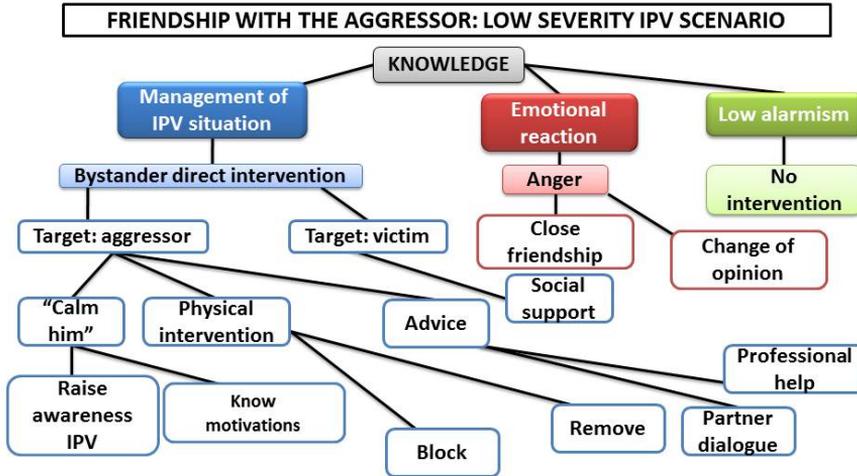
Figure 4.6: Code Tree: Friendship with Aggressor (Low Severity IPV Scenario).

Among bystander interventions, participants indicated that would seek to raise awareness about his violent actions even putting himself in victim's shoes (*"I would ask him to put himself in her girlfriend's shoes, making me say what he feels after to undergo this kind of partner's behavior"* 1M).

Some bystanders would seek to calm and make reasoning the abuser friend (*"I would bring him out the party to speak and to make him reasoning"* 3F) while one female and three male bystanders would physically intervene blocking him or throw him out (*"I would intervene, I would move him against his will"* 6M).

Others would know the motivations to act in this way: *"I would try to understand why he had such a reaction and understand his motivations"* (26F). Few females also would give advice such as seeking a professional help or a dialogue with his girlfriend while two males also would try to give support to the victim.

However, some female participants tended to have an emotion reaction (*"As a woman and knowing my brusque character in the situation I would be very upset with my friend and I would take up the defense of her, despite my friendship with him"* 1F), that may bring to change the opinion about her friend or to close the friendship. It seems that the aggressor's knowledge

can lead to a less alarmist about the situation. Finally, two females declared that they would not intervene if they were a friend of the aggressor.

b. Second Chat
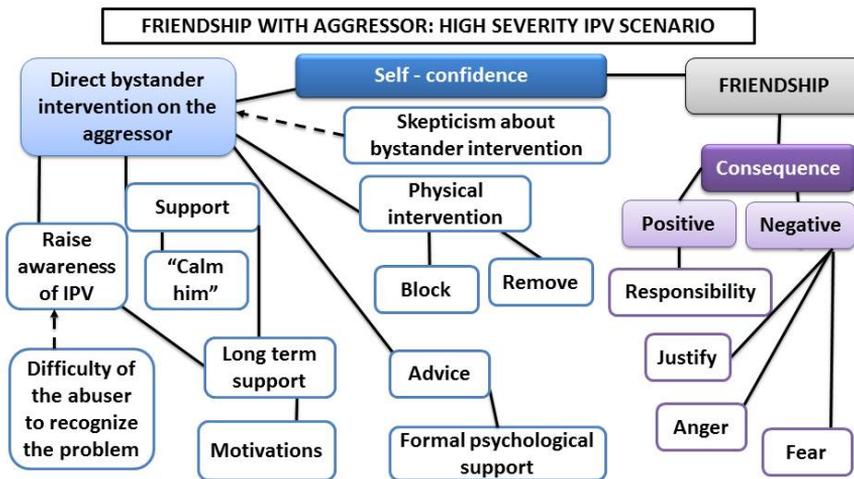
Figure 4.7: Code Tree: Friendship with Aggressor (High Severity IPV Scenario).

This category was present in 29 codes. Participants identified several direct interventions focused on the abuser and highlighted some consequences of their friendship with the aggressor (see Fig. 4.7).

Regarding direct interventions, participants said that they could help their abusive friend recognize his violent behaviors (*"I would talk with him by trying to put him in his girlfriend shoes and by making him understand that his girlfriend would have every right to press charges against him"* 1M), trying to know his motivations.

They remarked on the importance of staying in touch with their aggressor friend in order to offer him support over the long-term: *"I probably would call back and see to speak of situation... and knowing me I would insist on seeing"* (14F). Our findings showed that having a relationship with the perpetrator could increase bystanders' self-confidence to intervene directly: *"I would intervene... perhaps in a more decisive way, since I know and trust the guy"*

(26F). Moreover, some participants would physically intervene, blocking him or removing him from the house.

Participants, more females than males, suggested the importance of offering advice about formal support to their abuser friend, such as referring him to psychological services that help men with aggressive behaviors: *"I would say to get help from someone if he cannot control his anger"* (21F).

About indirect interventions, just one female participant proposed to involve an informal network, close to the abuser, to help him.

Our findings highlighted that being a friend of an abuser has different consequences for females and males. In particular, male bystanders declared feeling more responsible to act with an abuser friend compared to a stranger. Some females disclosed that they would tend to have a negative emotional reaction, such as fear or anger: *"I think I would be very angry with my friend"* (12F). They also reported that they would stay far from their perpetrator friend, end their friendship or isolate him: *"Do you think the group of friends should isolate him? Like a kind of punishment? I think in my case it would happen, but this is probably the worst option"* (8F). Moreover, one female participant recognized the risk in attempting to justify the behavior of an aggressor friend.

Finally, female participants mentioned three factors that might hinder changes in the abuser's attitudes and behaviors. Two such factors were related to the bystander intervention: the complexity to find a solution and the resulting skepticism in her own ability to face the IPV episode. The other was associated with the non-recognition of the problem by the abuser friend: *"A few days ago I became aware of a similar situation in my group of friends. The guy in question has always been a "hot head"… he uses alcohol and soft drugs. One night he broke a glass table and pushed his girlfriend. The result were several bruises on her face. How can we help a person who commits such acts? Therapy is a choice, but for him there isn't a problem"* (29F).

4.3.7   Seventh Area: Bystander Perceptions of the Main Causes of IPV

a. First Chat

Content analysis derived 48 codes explaining the principal causes of IPV. Considering the social-ecological model of IPV, codes were divided into three

main areas: individual, relational and community-societal factors.

At individual level (24 codes), aggressor's factors that may associate with IPV were: jealousy, control, lack of trust, low self-esteem, insecurity, aggression, anger, frustration, inability to manage negative emotions, lack of respect, lack of love, alcohol abuse, psychological problems and prior history of violence.

Moreover, some female participants recognized victim's factors related to IPV such as fear of partner's reaction, dependence, unrealistic beliefs (e.g., *"Many women believe that it is just an isolated incident, and that will never happen again"* 32F; *"Many women see these behaviors as a sign of love"* 35F), forgiveness (*"I have often also heard on TV that after the aggressor often apologizes and the victim believes in him"* 34F), and justification of partner's behavior.

At relational level (12 codes), participants reported that an asymmetrical relationship where one partner wants to keep the power on the other is a feature of abusive relationships: *"They developed the idea that the partner is their property"* (7M). Other factors were: lack of good communication, fear of losing the partner, unresolved problems within the couple, incongruent characters, and negative feelings towards each other.

At community and societal level, participants indicated that cultural factors related to machismo (*"The maintenance of masculine status called patriarchal"* 11M), and educational factors that legitimize gender stereotypes (*"Surely there are also gender stereotypes, shared ideas, although not at public level but at least in "bar talk" that justify many actions"* 14F).

b. Second Chat

Our findings showed 45 codes on the main causes of IPV. As the first chat, the majority of the codes regarded individual factors related to this problem (32 codes). This factor focused on the characteristics of the perpetrator: impulsiveness, jealousy, low self-esteem, substance abuse and prior history of aggression and abuse. Female participants added other individual factors, such as psychological disorder: *"Violence could stem from the abuser's inner psychological issues, who, when faced with a difficult situation, begins to feel insecure and projects his insecurity on the other partner"* (9F).

Other individual factors were related to the victim's characteristics. Participants believed that the victim could be characterized by dependence and passive, which could be the result of having mixed feelings of love and fear

for the aggressor.

With regard to relational factors (5 codes), participants recognized the lack of good communication as the main cause of IPV: *"... and the fact that too often there isn't a good communication between couples"* (23F).

Finally, the community and societal factors (8 codes) included cultural norms that support traditional gender values: *"Numerous studies have argued that it is a cultural and educational issue. Over the past few decades, women have entered the labor market in addition to the role of mother and wife. They have much more freedom than they did in the past, sometimes they attain brilliant careers, more than men and all this creates a sense of frustration in men. They no longer have the authority like they had in the past, so now they are seeking to reestablish it through violent and aggressive methods"* (20F). Female participants added that causes of IPV also include attitudes that support violence as an acceptable way to resolve conflicts.

4.3.8 Eighth Area: Bystander Perceptions of Suggestions for IPV Prevention

a. First Chat

A total of 46 codes described participants' IPV prevention suggestions that were divided following the social-ecological bystander model of IPV, and female and male participants proposed similar interventions.

The majority of strategies was at community and societal level, and the main IPV prevention was campaign of awareness about gender violence: *"It would be desirable to organize meetings or seminars open to all where it aims to raise awareness of the argument, because unfortunately it is still a taboo"* (1F). As IPV prevention strategy at community and societal level, some participants indicated the increase of the professional services, raising the awareness of services for victims. Finally, one male participant recognized the important of specific law about IPV as a strategy to prevent this issue.

As IPV prevention strategies both at the individual and relational level, participants proposed psychological intervention where an individual or the couple can work on emotion management and dialogue.

In particular, the topics of IPV prevention may be increasing the knowledge about what is IPV (*"How to recognize the typical signs of a violent person"* 28F; *"It is important to understand that violence does not start with a kick, a punch or any other physical act, part first by verbal violence*

and humiliation. Verbally aggressive attitudes are already indicators that should serve to reflect and to sound some alarm bells, not allowing to reach even more degenerative situations" 6M); educating people to respect; and increasing the knowledge of the legal consequences of IPV encouraging police reports (*"Fight the fear of denouncing violent or otherwise dangerous behaviors"* 4M).

The principal context in which the of IPV prevention could be applied was the school (e.g., elementary, middle schools, high schools, universities) by means of an early education about not violence, which can also involve families or *"encouraging psychological services offered by schools"* (11M). Participants also highlighted the media or public service announcement as a way to raise awareness of IPV: *"Some time ago on buses in Florence there was a prevention campaign about IPV with lots of slogans and useful numbers. I believe that prevention is a good idea if it is transmitted through media that are accessible to all citizens"* (29F). However, participants recognized a possible non-effectiveness of the media in preventing IPV. Other possible contexts were workplaces and churches.

b. Second Chat

Participants suggested several IPV prevention strategies (39 codes), similar to those suggested during the SOFGs about low severity IPV vignette.

They suggested some individual prevention approaches focused on raising awareness about the issue of IPV and to how to recognize signs of abuse, not just physical violence, but also psychological abuse: *"In my opinion, clarifying the concept of violence would help a lot. The problem is that one often hears about it, but the ways in which it can manifest itself within a couple are not clear. Violence isn't limited to hitting someone, it is also saying insults as well as other minor actions that probably occur daily. There is a lot of confusion regarding what it is"* (14M).

For participants this approach targeted the general population: *"People should have access to more information about intimate partner violence. For example, I myself don't know so much about this problem. However, since it is so widespread and very often kept quiet, it would be good to talk about it more"* (3F). It was said that prevention efforts should focus on young people, because it is easier to change their attitudes (*"An adult who has received a particular education or has been living in at risk socio-cultural environment has habits and ways of thinking that are difficult to eradicate.*

For this reason, prevention must start early" 27F) and because at this age these types of violent behaviors are common among couples (*"I would focus on adolescents ... they are not a random target ... Many times, at least in my reality, I could see how teenagers, during a conflict, could want to put out a cigarette on his girlfriend's face"* 6M).

In terms of relational strategies, participants highlighted the importance of teaching youth conflict resolution strategies, how to manage their emotions effectively and sex education: *"Maybe we should also dedicate more time to sex education and what it means to be with someone... I believe that many people nurture the idea of partners as sexual objects. An object is easier to be a target of violence"* (8M).

Concerning community and societal prevention interventions, participants proposed to increase the presence and the awareness of professional services for victims and aggressors. As pointed out by 10F: *"It is necessary to make people aware of the help centers in their local community and advertise these services relentlessly ... We need more psychologists and professionals available in the public health services for both aggressors and victims".*

Moreover, they suggested enforcing laws to better protect victims (*"We said to file a complaint ... it's important to show that this solution is safe and can be a concrete action that leads to the certainty of punishment. This could encourage victims to report more frequently and could serve as a deterrent for aggressors"* 14M). Participants also said that making current laws and policies better known to the public is key in getting victims to report IPV (*"We must inform citizens what to do from a legal standpoint... we have to facilitate the process as much as possible, which will encourage people to file police reports"* 25F).

Another main category identified by participants was the different contexts in which IPV prevention could be applied. The main environment mentioned were school settings and participants proposed to provide violence prevention curriculum to all students in elementary, middle school and high-school: *"We should raise awareness of violence as an aspect of life that can occur to us or to others. This requires education and prevention interventions in schools, perhaps by including in the school curriculum a series of group meetings with a psychologist who specializes in gender-based violence"* (28F).

For adults, intervention efforts in work contexts, local associations or in pre-natal courses were cited. For example, 29F said: *"If I have to think about*

what to do in my community, surely I would start with volunteer centers.
They usually organize events and involve not only young people but also
families, adults and the elderly".

To reach a broader audience, they suggested using mass media strategies
(*"I find public service announcements in the buses are brilliant because there*
is a lot of people like me who spend hours commuting" 29F) and social net-
works (*"Violence prevention strategies should use mediums closer to young*
people, such as social networks or television programs, so that messages are
better targeted" 7F) as promising prevention approaches.

4.4 Discussion and Conclusions of First Research Study

The aim of this study was to develop a "theory" based on GT approach [132]
about bystander intervention and factors that may influence bystander's de-
cision to act or not in different IPV scenarios (see section 4.2.3). Participants
reported an interrelated set of individual, relational and situational factors
that affect bystander choices, highlighting gender differences in their actions.

In the high severity IPV scenario, the majority of participants recognize
the seriousness of the episode of IPV and perceive the necessity to inter-
vene evaluating which actions may be most useful (i.e., direct or indirect),
while, in the low severity IPV scenario, some participants report the need
of more information about the relationship and its issues. Moreover, some
participants evaluate the low IPV scenario as a common episode that it does
not impress them and they also express judgments which blaming the victim
and the justifying aggressor. These findings are consistent with past research
suggesting that bystanders are more likely to intervene in more severe cases
of IPV, where the risk of injury to the victim is greater [84, 100]. As found
in previous research on bystander's gender (e.g., [84]), this study shows that
male bystanders are more likely to intervene in an ineffective way with more
risky behavior (e.g., getting physically involved with the abuser) than fe-
males. Females are more likely to offer effective and helpful interventions in
IPV situations such as offering protection to the victim through informal and
formal social support. Moreover, consistent with other studies [26, 180, 232]
males participants seem to be characterized by more IPV myth acceptance,
justifying more the aggressor behavior and blaming more the victim.

Consistent with past studies about bystanders in groups [214], our anal-

ysis suggests that bystander intervention within a group context has mixed results in terms of helpful or unhelpful influences. Indeed, participants point out that bystanders may feel more comfortable helping someone if they are in a peers group, but they also report, in accord with to the past literature of bystander intervention [203] some negative behaviors such as diffusion of responsibility, social influence, embarrassment, etc. Also in a group context, gender is an important factor that influences the bystander behavior. In particular, the composition of the group plays an important role. For the participants, an all-male group is more likely to act impulsively whilst all-female group has a greater likelihood to focus on the victim by protecting her. These results are congruous with past literature on gender and prosocial behavior (e.g., [111]).

In accord with other studies [64,267], our findings showed that knowing a friend that behaves IPV could increase bystander self-confidence to manage the IPV episode and to direct intervene towards the aggressor. Results also highlighted that being a friend of an abuser has different consequences for female and male participants. As Burn's results [64] found that males have more likelihood to help an aggressor who is a friend, our findings showed that, in the high severity IPV vignette, male bystanders reported feeling a greater sense of responsibility to act with an abuser friend compared to a stranger. In contrast, for female participants, knowing the perpetrator may negatively impact how they perceive him (i.e., they were more likely to have negative emotional reactions such as anger or fear, or justify his behavior). Females' opinions are consistent with prior research highlighting that a close relationship between the bystander and the aggressor has both more positive and more negative bystander perceptions and reactions; a greater likelihood to perceive the situation as being safe to intervene, but also to justify the situation (e.g., [44]).

Participants underlined the advantages and disadvantages of their interventions and identified helpful strategies to avoid potential barriers (e.g., continue offering emotional support to the victim, keeping calm with the abuser, and activating informal and formal network). In general, the participants were willing, especially in the episode of high severity, to help a friend both in the case of a victim and an aggressor of IPV with positive bystander interventions. These findings can also be explained by some individual characteristics of the participants (see Table 4.1). Descriptive statistics of the sample showed that about a quarter of the study participants were in an

abusive relationship or knowing someone in a violent relationship, and a minority has also experienced maltreatment during childhood. Past literature [40,84,232,380] indicated that individuals with these characteristics are more likely to intervene as a bystander in the IPV conditions.

Interestingly, the results also suggest that participants do not perceive the possibility of playing an active role in ending IPV. More specifically, in the high severity IPV scenario, some participants highlighted a sort of skepticism about bystander intervention and, in the low severity scenario, benefits associated with bystander intervention are seen as improbable. Furthermore, participants thought that the main causes of IPV are at individual level. On the other hand, the majority of IPV prevention strategies was at community and societal level, not including a possible assumption of responsibility in reducing this problem by participants. As suggested by McMahon and Dick [234], some participants may be more aware of the complexity of IPV and its negative consequences, having exposing of IPV, and this can lead to perceive themselves as less able to address the issue. Therefore, as proposed by bystander prevention programs on sexual violence and IPV, bystander approach should give to community members, such as university students, an active role in stopping violence by promoting their responsibility and collective efficacy and empowering their skills to deal with the continuum of IPV in order to modify negative social norms [29,54].

This study has some limitations. First, a convenience sample of university students from community psychology classes was used in the study. By means of qualitative methods, it was possible to obtain in-depth information on university students' perceptions about bystander intervention on IPV within a socio-ecological framework. Therefore the results of these studies cannot be generalized to students from other university courses or non-students coming from the community. Future studies could extend the findings of this exploratory research involving different key informants (e.g., young adult from community settings, experts in the field from local services, etc.) in order to develop bystander intervention for reducing and preventing IPV tailored to individuals' needs.

Second, the study sought to describe how participants can help a female friend victim of IPV, exploring individual (e.g., gender differences), relational (e.g., male abuser: unknown vs. friend), situational (e.g., role of the peer group), community and societal factors (e.g., perception of the IPV causes and preventive strategies). As such, the results cannot be extended to the

bystander interventions in the case of IPV in which the victim is a stranger, where violence is bidirectional or female to male, or finally in same-sex relationships. It is possible that in these cases the bystander intervention is perceived differently by individuals presenting unique challenges.

Despite these limitations, the study also has some strengths that add insights into bystander intervention literature. Following the suggestion made by Banyard [27], we adopted a socio-ecological IPV bystander intervention model which integrates Bronfenbrenner's [58] ecological model to Latené and Darley's model [202] that allows exploring factors that a different levels have an influence on bystanders' decision to help a female friend victim of IPV. The findings of this qualitative study suggest that some individual (e.g., high-risk assessment, high amount of information, female, probable benefit), relational (e.g., knowing the aggressor) and situational factors (e.g., presence of peers group) may lead to increase the bystander's willingness of intervention. However, our findings point out that the same factors might also be sabotaged by some psychosocial processes leading to no intervention or an ineffective intervention of bystander. For instance, female participants seem more willing to help a female friend victim of IPV than male participants but when women also know the abuser they tend to assume negative bystander attitudes and behaviors while men seem to feel more responsible for reducing the aggressor's violent behavior. Thus, the research give suggestion about critical factors that may play a different impact on the complex process of bystander behavior.

Finally, another important contribution of this study is the use of an online setting that may be effectively adapted to this type of research design. For instance, participants expressed their opinions freely even when these does not constitute socially desirable concepts (e.g., diffusion of responsibility, impulsivity, fear, blaming the victim, justifying the aggressor etc.).

Given that IPV is a sensitive topic, future research may also continue to utilize online methods as SOFGs, which are able to guarantee anonymity, and they also allow to freely discuss a topic, proving more knowledge for the researchers [185, 290, 356, 381].

Chapter 5

Bystander Intent to Help in Intimate Partner Violence Situations: an Online Quantitative Cross-Cultural Study among University Students

  In this chapter, we propose a cross-cultural study in order to identify which sets of factors may affect the intent to help a friend or a stranger involved in sexual assault and/or intimate partner violence (IPV). Given the high rates of IPV among university students, participants are 1128 male and female Italian (333), Brazilian (303) and, French-Canadian (492) university students. The results of our study show that participants are more willing to help a friend than a stranger. Moreover, a strong factor that may influence the intent to help a friend or a stranger is the perception of peer helping norms. Italian participants report a less willingness to help both a friend and a stranger during sexual violence and IPV circumstances. The study suggests that for increasing the intent to help a friend and a stranger, especially in the Italian context, the only implement of social policies contrasting IPV

> *is not enough but it also necessary that these policies will reach general public. To reduce the high rates of IPV, bystander prevention programs should give knowledge and skills about common and specific challenges of dealing with IPV suffered or perpetrated by someone that an individual knows or not.* [1]

5.1   Introduction

Intimate partner violence (IPV) is a significant problem over the world and it refers to different forms of violence such as psychological, physical sexual violence by a current or past intimate relationships [55, 382].

For instance, data from police-reported surveys found that Canadian women are four times more likely of being IPV victims than men, with Québec and Ontario showing the lower rates of IPV [324]. The most common form of violence was the physical assaults and the most common abuser was a dating partner for both women and men victims [324]. According to self-reported data from the General Social Survey (GSS), although similar rates of IPV between men and women (around 6%), females were more likely to suffer from the most severe forms such as sexual violence [324].

In Brazilian context, a population-based household survey found that among women aged $15 - 49$ years, 50.7% indicated of having experienced some form of IPV such as psychological, physical and sexual violence [221]. The higher rates were for psychological violence alone (18.8%), followed by psychological violence complemented by physical violence (16.0%), all forms (9.2%), physical alone (3.7%), and sexual or sexual accompanied by physical violence or psychological violence (3.0%) [221]. Concerning sexual violence by an intimate partner violence (IPSV), another study found that women had higher rates (11.8%) of IPSV than men (5.1%), except in the case of homo/bisexual partner relationships where there was for men but not for women a higher significant difference about IPSV between homo/bisexuals and heterosexuals [312].

In Italy, research on IPV is developing with the second national survey on violence against women conducted in 2014 by the Italian National Institute

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of Statistics [168]. The survey included 24761 women (range: $16 - 70$ years) and results reported that 5.2% of all violent episodes were committed by a current partner and 18.9% by a previous partner. Moreover, the most severe forms of violence were perpetrated by an intimate partner, such as rape and severe physical violence [168].

5.1.1 Intimate Partner Violence Victimization and Perpetration among University Students

The problem of IPV is very common and serious among university students [210,217]. The International Dating violence study (IDVS) found that among 16 different countries a considerable rate of university students perpetrate physical IPV (range 17%-45%) or cause injury (range 1.5%-20%) toward their partner, showing similar rate between males and females for physical assault but not for injury [341]. In particular, a Brazilian study participating in IDVS found that the majority of the sample perpetrated (76.4%) and suffered (75.9%) of some form of IPV and the study also showed a high presence of bidirectional violence (83.9) [122]. Both for perpetrated and suffered IPV, without gender differences, the highest rate was for psychological violence, followed by sexual violence and physical violence [122].

About victimization only, Sabina and Straus [306], analyzing IDVS data come from only the United States, found that for both male and female university students the most common form of IPV was psychological aggression (both males and females 34.4%). The study showed that the various form of violence can be together and the most frequent combination was psychological, physical, sexual violence for both males and females [306]. Among university students the second most common victimization profile was different for males and female: for men it was psychological only, while for women it was sexual violence only [306].

About perpetration only, a recent study that compared male Asian university student with male European university students found that the first were more likely to perpetrate severe physical assault and severe psychological aggression than male European university students, while the latter were more likely to commit minor psychological aggression than male Asian university students [266]. No cultural differences were found for minor psychological violence and severe or minor sexual violence [266].

5.1.2 Understanding Bystander Intent to Help as a Contribute to Reduce IPV

Given the high rate of IPV, efficient prevention programs are recommended. Bystander intervention represents a promising opportunity, by providing skills and abilities to change social norms which support violence [29]. In this field, research that seeks to comprehend which factors influence the bystander intervention during an episode of IPV represent an important contribution [380].

In this background, as individual factor, people with higher bystander self-efficacy [30, 206], lower rape myth acceptance [30], and higher awareness of the problem [26, 30] are more willing to intervene in IPV episodes.

Other studies found that knowing someone that was a victim or having experience family violence (e.g., witness IPV as a child or experienced child abuse) may increase the likelihood to intervene as a bystander [40, 84, 232]. Moreover, a recent study showed that experience of sexual and physical victimization and physical perpetration may increase the likelihood of bystander behaviors, especially among female participants [380].

Some studies investigated the decision-making process of a bystander, showing that barriers are related to a decreasing of intervention [64, 83].

Gender is an individual factor that has a key role for explaining bystander behavior [27]. Some studies found that females report more levels of bystander behaviors [26, 232]. On the other hand, others did not find gender differences in bystander intent to help [180] or only in the case of less severe IPV [84]. Finally, females are less likely to engage in risky behavior as bystander [83] and engage in more indirect bystander behavior [253].

As relational factors, bystanders are more likely to help a potential victim who is a friend than stranger [44, 64, 180, 267].

Moreover, lower perception of peer norms supporting coercion in relationships was associated with higher intent to help as a bystander [30, 59].

Although the literature has recognized some individual as well as relational factors that may have a positive influence on bystander behavior, there are few study that investigated the community and societal in influencing factors [27].

For instance, sense of community seems to be a predictor or intent to help [26].

Moreover, as suggested by Banyard's review [27] cross-cultural studies may give important knowledge about how societal factors may influence

bystander behavior. Indeed, in different countries member of communities, institutions, agencies, etc. may have different perceptions of IPV issue due to the adoption of not similar preventive measures [345].

In Italy, the attention to violence against women has been limited on the side of institutions and political parties [302], with the development of recent laws, such as law 154/2001 about domestic violence; law 38/2009 about stalking, law 77/2013 about the ratification of Council of Europe convention on "Preventing and combating violence against women and domestic violence"; law 93/2013 concerning the contrast of the femicide; law 80/2015 about the right for women included in protection programs to take time off work [276, 302]. A European survey showed that the majority of Italian women declare that they are not aware of any laws or political measures about domestic violence victim protection (52%), and prevention of domestic violence (58%) [126].

In Brazilian context, through years of collective efforts, the Brazilian feminist movements with the support of the United Nations and other organizations have managed to make a social and political change resulting in the Maria da Penha law (law 11.340/2006), the *"first federal criminal domestic violence law in Brazil"* [303, p. 69]. However, Brazilian women are at higher risk of being murdered [367], and in March 2015 the Brazilian penal code changes including femicide act and Brazilian starts to assume the Latin-American Model Protocol for the Investigation of Gender-related Violent Deaths [379].

The Canadian context is different. Indeed, its domestic violence services and policies are evaluated as one of the most advanced of all world [320]. Since the mid-1970s, women' movement and non-governmental organizations (NGOs) started to implement in initiatives to answer to violence against women and their efforts produce, in the early 1980s, the application of pro-charging and pro-prosecution policies [345]. However, the Canadian criminal justice response to IPV has several critical issues to address the different needs of immigrant, First Nations and other minority group women, bringing these women to not ask help from formal services for different factors such as isolation, economic dependence, cultural norms about family, cultural insensitivity, perceived of discrimination, etc. [1, 8, 149, 345, 346].

5.1.3 Aims of the Research

Under this theoretical background, the present cross-cultural study sought to examine the bystander intention to help a friend and a stranger during episodes of sexual assault or IPV among Italian, Brazilian and Canadian university students.

As suggested by Banyard's [27] review, we used a socio-ecological IPV bystander intervention model (see Fig. 5.1), which combines Latané and Darley's model [202] and Bronfenbrenner's [58] ecological model, in order to better understand which factors of each level may influence the bystander intention of helping a friend and a stranger.

As shown in Fig. 5.1, the individual variables that this study explored were: gender, experience of being a witness of IPV during adulthood, childhood traumatic events of violence, knowledge/training about IPV, domestic violence myth acceptance, self-efficacy (i.e., general and specific to deal with violence), and decision-making styles.

As for relationship factors, the study investigated the role of peer helping norms.

Sense of community and countries of data collection were the community and societal variables examined by this study.

The principal aim of this cross-cultural study is to identify which set of factors is related to the intent to help during sexual assault and IPV situations, exploring possible relational distance differences (i.e., victim as a friend or victim as a stranger) and countries differences. More specifically, this study tried to answer the following research questions:

- Research question 1. Which factors influence university students' intent to help during a situation of sexual assault or IPV?

- Research question 2. Are the intents to help a friend and a stranger affected by similar or different sets of factors?

- Research question 3. Do Italian, Brazilian, and Canadian university students differ in the factors that influence the intent to help a friend and a stranger involved in sexual assault or IPV circumstances?

The answers to these research questions may give suggestions on how to increase positive bystander behaviors.

Based on past literature, we tested different hypotheses related to four main aspects:

1. Hypotheses 1 (Individual Factor). Individual factors will differently influence the intention to help.

   In particular,

   - Participants with higher self-efficacy (general and specific of dealing with violence) will be more willing to help both a friend and a stranger involved in sexual assault and IPV situations.

   - Instead, individuals with greater domestic violence acceptance and maladaptive decision-making styles will report less intent to help a friend and a stranger during sexual assault and IPV circumstances.

   - Moreover, having knowledge/training in the field of IPV, experiencing traumatic events about violence during childhood (i.e., child abuse or witness of family violence), and being witness of IPV during adulthood (i.e., knowledge of an IPV episode or first-hand observation of IPV) will increase the intent of helping a friend and a stranger involved in sexual assault and IPV situations.

   - Given the previous studies about the relation between bystander intent to help and gender differences showed mixed results, no prediction was done.

2. Hypotheses 2 (Relationship Factor). Intention to help will vary by relational distance (friend versus stranger) and perception of peer helping norms.

   More specifically,

   - Participants will report more willingness to help a friend than a stranger involved in sexual assault and IPV situations.

   - Individuals with a greater perception of prosocial peer helping norms will report more intent to help a friend and a stranger during sexual assault and IPV circumstances.

3. Hypotheses 3 (Community Factor). A higher sense of community will increase the willingness to help both a friend and a stranger involved in sexual assault and IPV situations.
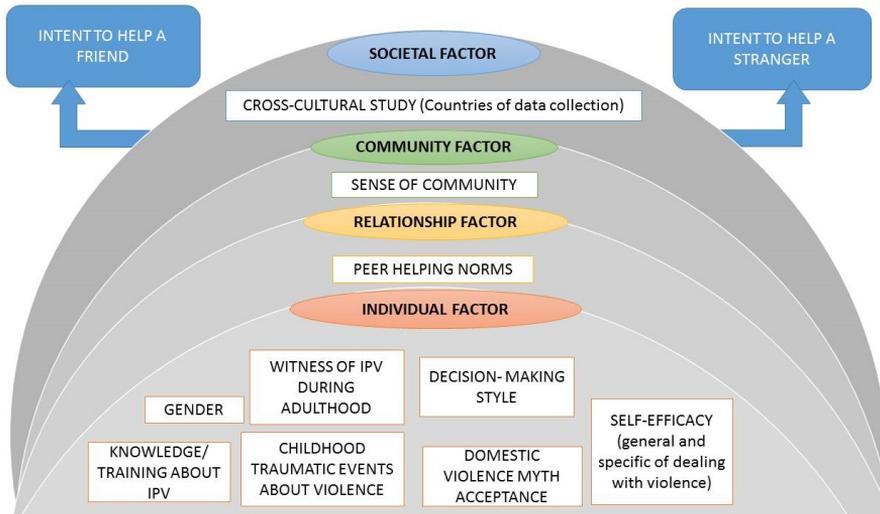
Figure 5.1: Socio-Ecological IPV Bystander Intervention Model. The figure shows the Individual, Relationship, Community and Societal variables that this study explores as possible factors that may influence the bystander intention to help a friend and a stranger during episodes of sexual assault or IPV.

4. Hypotheses 4 (Societal Factor). Different cultural norms and social policies about IPV may influence the bystander intent to help.

   Specifically,

   - Given the different background about IPV of Italy, Brazil, and Canada, Italian participants will report less intent to help a friend and a stranger involved in sexual assault and IPV situations than Brazilian and Canadian counterparts, however no prediction was made about the sets of factors that are related to the intent to help in the total sample and in the three different countries.

5.2   Methods

5.2.1   Participants

Participants were 1128 male and female Italian (333), Brazilian (303) and, French-Canadian (492) university students. A total of 61% of the sample was females and participants ranged in age from 18-52 years (M = 23.933, SD = 4.853). Italian participants had a lower mean age [M = 22.934, SD = 3.977; range: $18 - 51$ years; $F(2, 1224) = 10.604, p < 0.001$] than Brazilian (M = 24.158, SD = 5.101; range: $18 - 51$ years) and French-Canadian students (M = 24.474, SD = 5.136; range: $18 - 52$ years).

Italian sample was composed by 100% of students from the University of Florence. The Brazilian students were come from the University of São Paulo (e.g., campuses: city of São Paulo = 95.4%; city of Ribeirão Preto = 1.3%; and city of São Carlos = 3.3%). The majority of French-Canadian participants studied at the Université du Québec à Montréal (74.5%) while the minority studied in other Universities in Quebec. The sample consisted mostly of undergraduates student (74.7%) and more than a half (57.5%) were full-time students.

The majority of participants lived with parents (46.5%), following by roommates (19.8%), partner (17.6%), alone (7.4%), with other family members (4.7%) or with others (4%). Almost three-quarters of the respondents (73.2%) reported that they did not believe in a religion and who believed was for the majority Catholic (73.6%) [see also Fig. 5.4 (b)]. While only 2.1% and 2.5% of participants declared, respectively, to do not have a friend and to have only one real friend, another 48.2% reported attending more groups of friends. The remaining stated that they had several friends but not a fixed group of friends (25.8%), and they had a fixed group of friends (21.4%).

Figs. 5.2, 5.3 and 5.4 shows the participants' socio-demographic information for each country and their Chi-square values.

Canadian participants were more likely to be females than males compared to Brazilian and Italian participants [see Fig. 5.2 (a)].

Canadian students were more likely to live with their partners or alone than Brazilian and Italian students. Instead, Brazilian students were more likely to live with other relatives or with other people and they were also less likely to live with roommates compare to Italian and Canadian students. Finally, Italian students are more likely to live with their parents

than Canadian students [see Fig. 5.2 (b)].

Brazilian participants were less likely to be full-time or part-time students and more likely to be student-workers than Italian participants. Brazilian participants were more likely to be students looking for a job than Canadian participants [see Fig. 5.3 (a)].

Canadian participants were more likely to be undergraduate and doctoral students than Italian participants who were more likely to be graduate students than Canadian participants [see Fig. 5.3 (b)].

Finally, Italian students were more likely to believe in a religion than Canadian students [see Fig. 5.4 (a)].

When the participants answered the questionnaire, 63.3% of them had a relationship with a partner. Only 9.4% never had a boyfriend/girlfriend. The others were single but they had at least one relationship in the last year (14.5%) or before the last year (12.8%). A total of 41% of participants was unmarried while 49.7% reported having a stable relationship and 8.4% reported living in common-law or being married. Only 0.9% of participants was separated or divorced. Almost all the sample (92.3%) had a heterosexual orientation in the last relationship.

Figs. 5.5 and 5.6 illustrate participants' descriptive information about relationship variables for each country and their Chi-square values.

Canadian students were more likely to have several friends but no a fixed group than Brazilians and they were also less likely to have a fixed group of friends than Italian students, while Brazilian students were more likely to have more groups of friends than Italians [see Fig. 5.5 (a)].

Canadian participants were less likely to never have a boyfriend/girlfriend than Brazilian participants [see Fig. 5.5 (b)]. They were more likely to be married or in a common-law relationship and they were less likely to be in a stable relationship than Brazilian and Italian participants [see Fig. 5.6 (a)].

Finally, Brazilian students were more likely to have a homosexual sexual orientation in the last relationship than Italian students [see Fig. 5.6 (b)].

5.2.2   Procedure

Participants were recruited in different ways: during the university classes, through an online announcement on University website or on informal online university students' groups, and by means of advertisements placed in the university bulletin boards.

$\chi^2 = 34.743 \ \ p < 0.001$

(a) Gender

$\chi^2 = 216.128 \ \ p < 0.001$
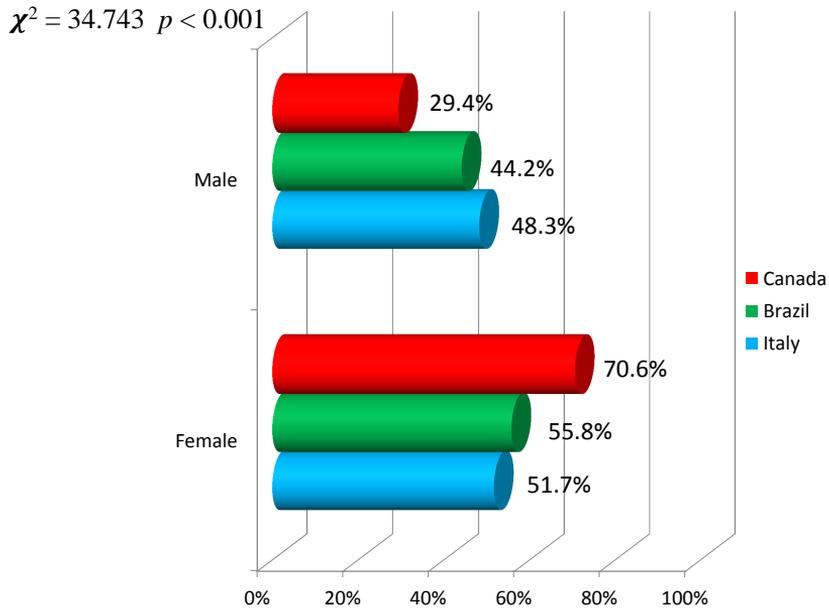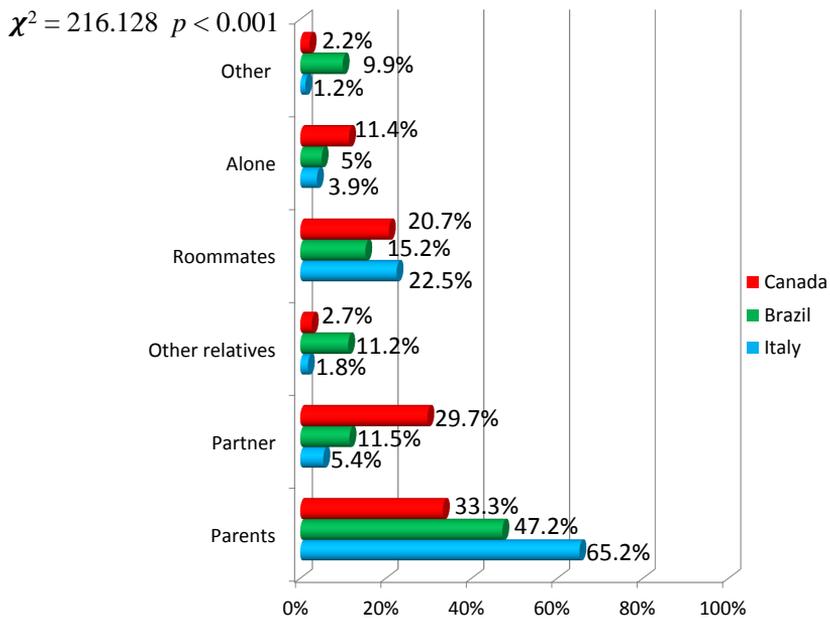
(b) Living With

Figure 5.2: Bar Charts of Gender and Living With variables for each Country (Percentage) and their Chi-square values.

$\chi^2 = 115.454 \quad p < 0.001$

(a) Occupation

$\chi^2 = 77.827 \quad p < 0.001$
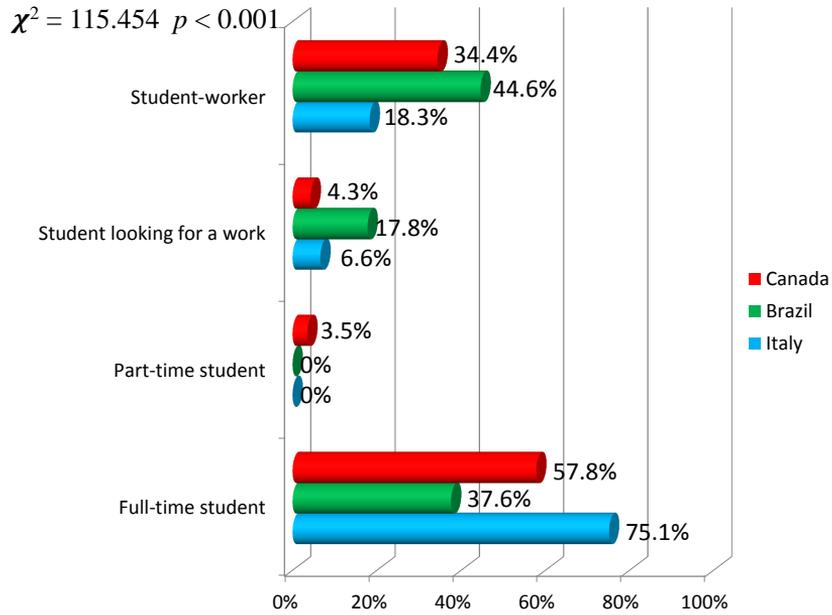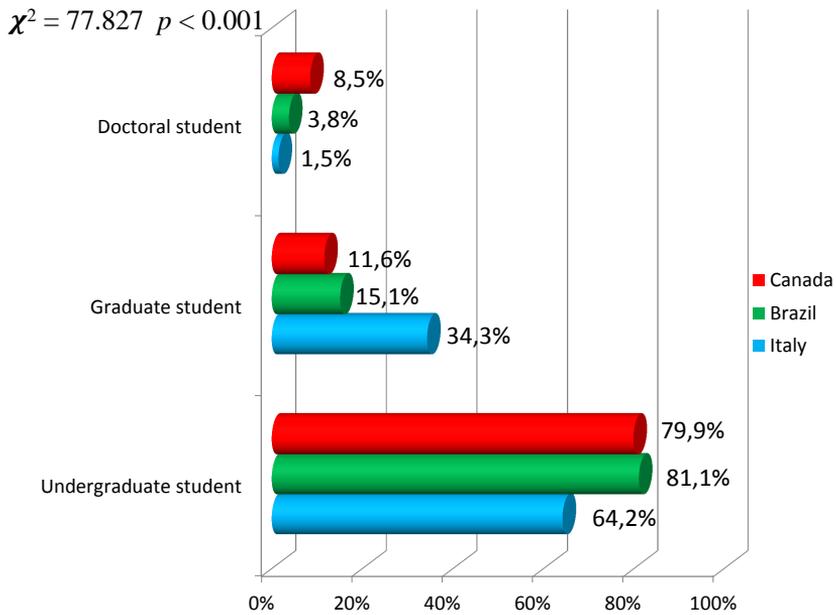
(b) Education

Figure 5.3: Bar Charts of Occupation and Education variables for each Country (Percentage) and their Chi-square values.
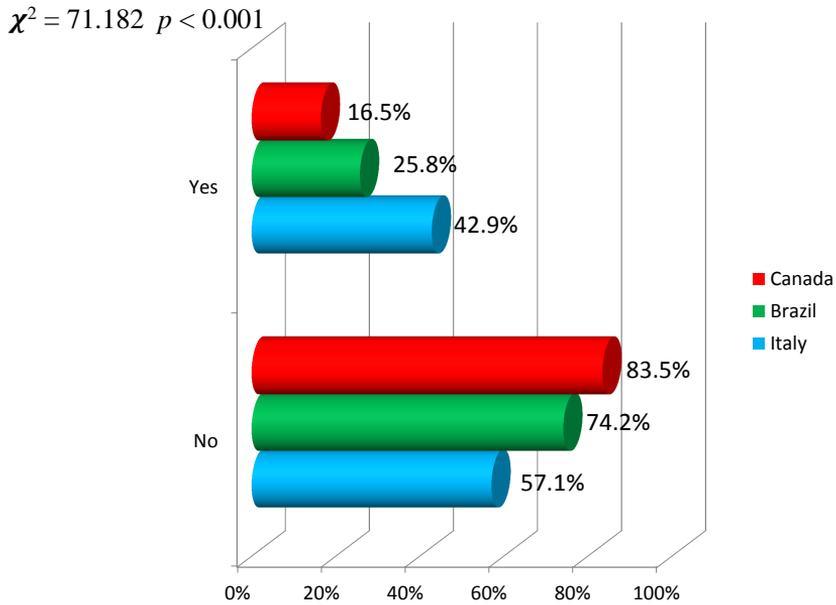
(a) Religion
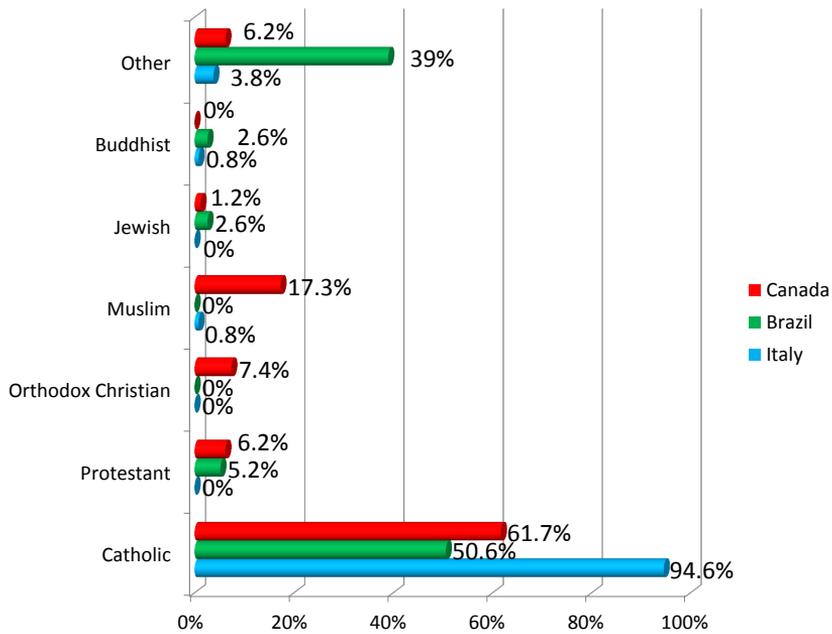
(b) Type of religion

Figure 5.4: Bar Charts of Religion variable for each Country (Percentage) and its Chi-square value.

$\chi^2 = 57.403 \ \ p < 0.001$

(a) Friendship

$\chi^2 = 21.656 \ \ p < 0.001$
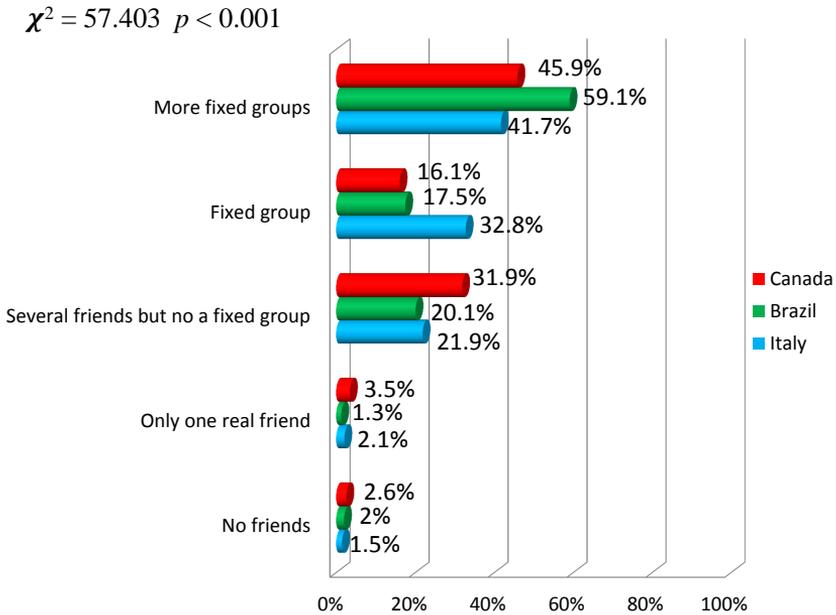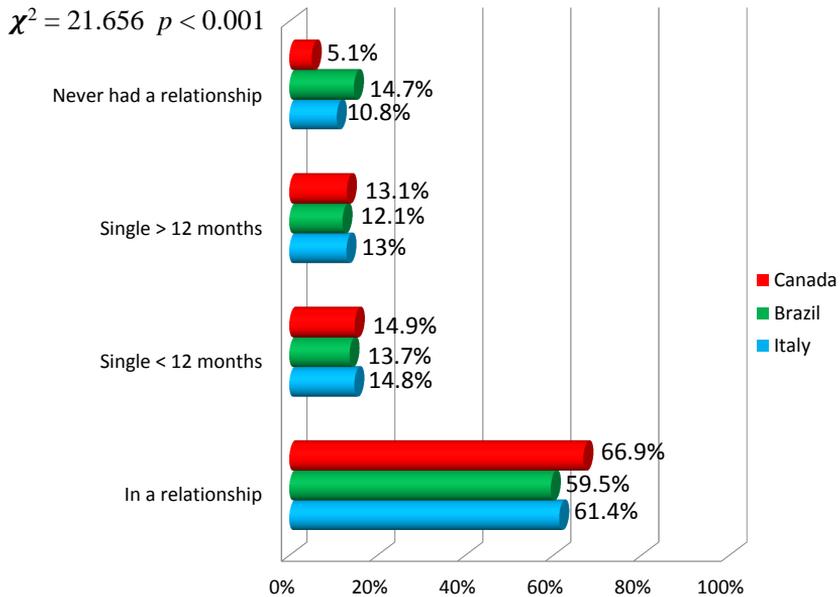
(b) Relationship Status

Figure 5.5: Bar Charts of Friendship and Relationship Status variables for each Country (Percentage) and their Chi-square values.
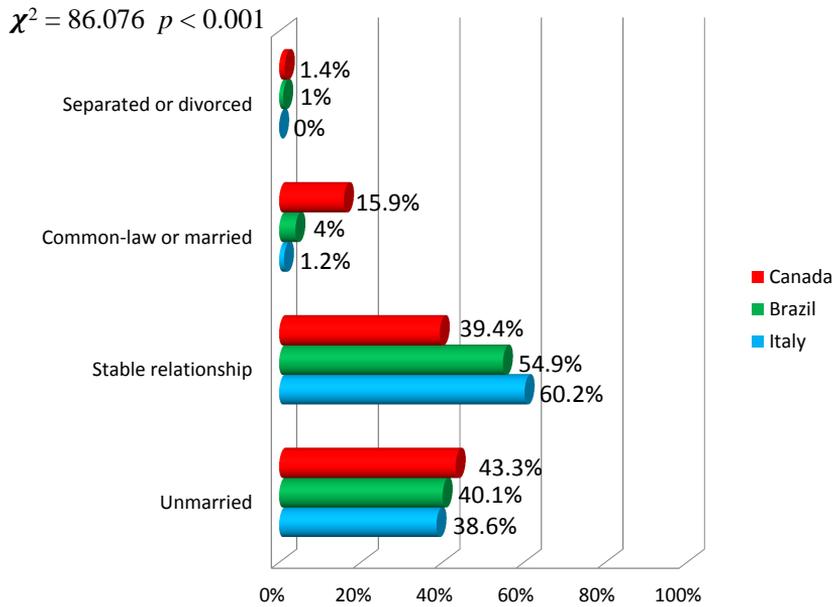
(a) Marital Status
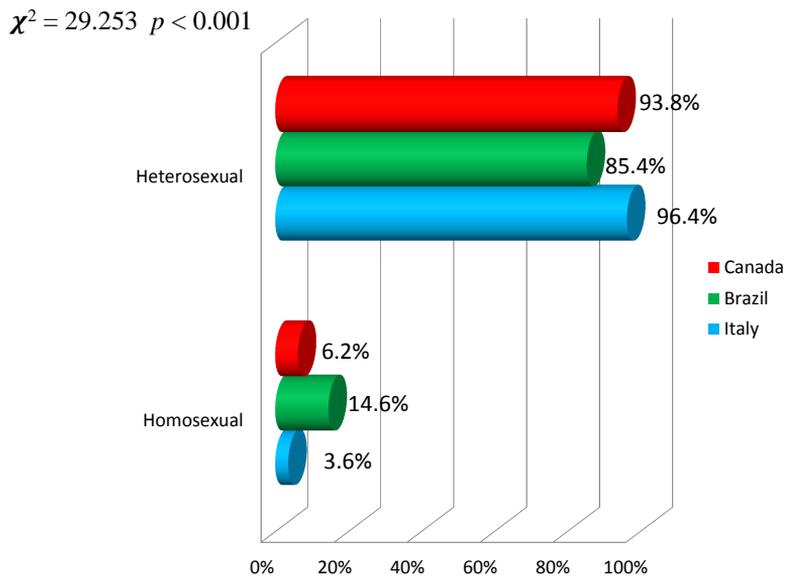
(b) Sexual Orientation in the Last Relationship

Figure 5.6: Bar Charts of Marital Status and Sexual Orientation in the Last Relationship variables for each Country (Percentage) and their Chi-square values.

Participants who declared a willingness to participate in the study received an e-mail invitation. The e-mail described the general aim of the research and it also explained that participation was voluntary and confidential and respondents could withdraw from the study at any time. At the end of the e-mail, there was the link for the online questionnaire as well as e-mail addresses and telephone numbers of the principal researchers in order to allow participants to contact the research team for any questions or concerns with respect to research or the online questionnaire.

To participate in the research, the only requirement to be met was that the individual had to be enrolled in a university program (i.e., for Italian participants: the University of Florence; for Brazilian participants: the University of São Paulo; for Canadian participants: universities of Quebec).

After giving consent, each student responded to the online questionnaires and at the end a list of resources about IPV with its services contacts (e.g., telephone, e-mail, etc.) was provided to the participants.

5.2.3 Measures

Socio-demographic Information and Relational Variables

A variety of socio-demographic information was asked, including gender, age, living with, occupation, education, and religion. Moreover, we demanded relational variables such as friendship, relational status, marital status, and sexual orientation in the last relationship (see Figs. 5.2, 5.3, 5.4, 5.5 and 5.6).

Childhood Experiences of Interpersonal Violence

Childhood experiences of interpersonal violence was assessing using two dichotomous items (0 = No; 1 = Yes) about direct (i.e., child abuse and neglect) and indirect (i.e., family violence) experiences of violence. We created an unique score as a dummy variable, where score of 1 indicates a participant with at least one childhood traumatic event about violence (i.e., if there is an answer of 1 to one item) and score zero means a participant with no childhood traumatic event about violence (i.e., all items answered 0).

Indirect Experience of IPV during Adulthood

Similar to Chabot and colleagues [84], indirect experience of IPV during adulthood was evaluating by means of two dichotomous items (0 = No; 1 =

Yes) about knowing someone (e.g., acquaintance, friend, relative, etc.) in a violent relationship and being witness of IPV (e.g., beaten, slapped, yelled at, humiliated a partner).

We built an unique score as a dummy variable, where score of 1 indicates a participant with at least one indirect experience of IPV during adulthood (i.e., if there is an answer of 1 to one item) and score zero means a participant with no indirect experience IPV (i.e., all items answered 0).

Knowledge/Training about IPV

Knowledge and training about IPV was assessed by means of four dichotomous items (0 = No; 1 = Yes) about attending a training on gender violence, participating in some study programs in which one of the main program units was related to gender violence, attending a lesson, a conference, or a workshop etc. in which an expert told about gender violence, and being a volunteer service for domestic violence. We created an overall knowledge/training about IPV score by building a dummy variable, where score of 1 indicates a participant with knowledge/training about IPV (i.e., if there is a response of 1 to one item) and score zero means a participant with no knowledge/training about IPV (i.e., all items answered 0).

Self-Efficacy

We measured both general self-efficacy and specific self-efficacy to deal with violence by means of two scales: Generalized Self-Efficacy scale (GSE) [314] and Self-efficacy to Deal with Violence scale (SEDVS) [69]

GSE [314] is a 4-point Likert scale (1= "not at all true" to 2 = "exactly true") which consists of 10 items assessing a general sense of perceived self-efficacy to cope with a different stressful life events such as "I am confident that I could deal efficiently with unexpected events".

The total score was obtained by calculating the mean score across items (range from 1 to 4) [315], with greater scores indicate a high general sense of perceived self-efficacy. We used the Italian version of the scale for the Italian sample [323]. For the Brazilian sample, we used the Portuguese version of the scale [257]. For the Canadian French sample, we adopted the French version of the scale [110]. In a cross-cultural study, the Cronbach's alpha ranged from 0.75 (India) to 0.91 (Japan) [311], and in the current study was of 0.88.

SEDVS [69] is a 4-point scale (1 = not at all confident; 4 = very confident), composed by 8 items. 5 items measure the perception of one's ability to act toward a IPV against a peer when one witness or becomes aware of it (e.g., "How confident are you that you could get help for someone whose boyfriend/girlfriend forces them to have sex with them?"), and 3 items related to the perception of one's ability to deal with IPV as a victim or aggressor (e.g., "How confident are you that you could tell someone you trust that you are abusing your boyfriend/girlfriend?").

The total score was obtained by calculating the mean score across items, then we multiply by 8 (range from 8 to 32); the factor 1 score was the mean score of its items, then we multiply by 5 (range from 5 to 20); and the factor 2 score was the mean score of its items, then we multiply by 3 (range from 3 to 12). Greater scores indicate a high one's ability to deal with violence as a bystander, or as a victim/aggressor.

For the Italian and Brazilian samples, the original English version of the scale was translated into Italian, and Portuguese, and then reported in the original language (back translation). For the Canadian French speakers, we used the version of a previous study, in which a two-factor structure was emerged [357]. In Van Camp and colleagues' [357] study, the internal consistency was 0.83 for helping behavior factor as a bystander and 0.52 for help-seeking behavior as a victim or perpetrator. In the current dissertation, the two factors showed Cronbach's alpha of 0.74 (Factor 1: "Helping behavior as a bystander") and 0.55 (Factor 2: "Help-seeking behavior as a victim or perpetrator") respectively.

Domestic Violence Myth Acceptance

Domestic Violence Myth Acceptance Scale (DVMAS) [277] was used to evaluate how likely participants' accept domestic violence myths. DVMAS is an 18-item scale and some examples of items are: "If a woman continues living with a man who beat her, then its her own fault if she is beaten again", "Domestic violence does not affect many people", "When a man is violent it is because he lost control of his temper.", and "A lot of domestic violence occurs because women keep on arguing about things with their partners.".

It is a 7-point scale (i.e., for the first 17 items: 1 = strongly disagree, 7 = strongly agree; for the last item: 1 = not at all, 7 = entirely). The total score was obtained by calculating the mean score across items (range from 1 to 7), with greater scores indicate a high acceptance of domestic violence

myth.

The original English version of the scale was translated into Italian, Portuguese, and French, and then reported in the original language (back translation). Cronbach's alpha was of 0.88 [277], and in the current study was of 0.87.

Decision-Making Styles

Melbourne Decision Making Questionnaire (MQDM) [228] allowed us to evaluate participants' adaptive or maladaptive decision-making styles.

MDMQ is a 3-point Likert scale (0 = Not true, 1 = Sometimes true, 2= True) composed by 22 items to evaluate basic patterns for decisional conflict situations. MDMQ consists in four subscales: Vigilance, Buck-passing, Procrastination, and Hypervigilance.

Vigilance may be considered as an adaptive decision-making pattern where individual, before making a choice, defines objectives, gathers information, takes into account and evaluates alternatives. This subscale is composed of six items and some examples of them are: "I try to be clear about my objectives before choosing", and "I like to consider all of the alternatives". High scores mean a high rational decision making. In the original study the Cronbach's alpha was of 0.80 and in this study was of 0.76.

Buck-passing refers to a maladaptive decision-making strategy in which an individual avoids responsibility to make a decision, leaving the decision to someone else [228]. Buck-passing consists of 6 items, such as "I prefer to leave decisions to others", and "I do not like to take responsibility for making decisions". The Cronbach's alpha was of 0.87 in the original study and it was of 0.85 in this research.

Procrastination is another maladaptive pattern in which a decision maker delays or postpone decisions: "Even after I have made a decision, I delay acting upon it", and "I postpone taking decisions to the point that in the end it is too late to choose" are two examples of this scale [228]. The Cronbach's alpha for this scale was 0.81, and in the current dissertation was of 0.76. The last scale consists of a maladaptive decision-making strategy called Hypervigilance. Hypervigilance is characterized by emotional stress and feeling under pressure in which a subject tries desperately a solution to recover a relief [228]. Items belong to this scale are 5 such as "The possibility that some small thing might go wrong causes me to swing abruptly in my preference.", and "I feel as if I am under tremendous time pressure when making

decisions". In Mann and colleagues' [228] study, the alpha coefficient was of 0.74 while in this study was of 0.71.

The score for each scale is given by the sum of the corresponding items (range from 0 to 12 for Vigilance and Buck-passing scale; range from 0 to 10 for Hypervigilance and Procrastination scale) and high scale values correspond to a high presence of that specific strategy decision-making.

MDMQ had a French adaptation [25] that was used for the French-Canadian sample. For the Italian sample, there is an Italian adaptation of MDMQ for the orientation of high school students aged 15-19 years [332], therefore, in this study with participants aged 18-51 years, Mann's scale [228] was translated into Italian, and then reported in the original language (back translation). For the Brazilian sample, the original instrument was translated into Portuguese, and then re-translated in English (back translation).

Sense of Community

To measure participants' sense of community, Multidimensional Sense of Community Scale for local communities (MTSOCS) [285] was used.

MTSOCS is a 4-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree) composed of 19 items which assess 5 different dimensions of territorial sense of community: membership, shared influence, help in case of need, social climate and bonds, needs and fulfillments.

Membership subscale includes 4 items such as "When I travel, I am proud to tell others where I live" and "I feel like I belong here". Shared influence subscale consists of 3 items like "If there is a serious problem in this town, the people who live here can get it solved". Help in case of need is a 4-item subscale which includes statements such as "Many people in this town are available to give help if somebody needs it", and "In this town people are not willing to help those in need". Social climate and bonds subscale includes 4 items such as "I have good friends in this town", and "It is difficult for me to form bonds with the people in my town". The last 4-item subscale is needs and fulfillments subscale which is composed of items such as "This town provides opportunities for me to do a lot of different things", and "In this town there is never much to do".

It is possible to calculate not only the score for each dimension but also a value of the total scale (i.e., Total MTSOCS Score). Upon item reverse of some items, the score of subscales was obtained by calculating the average of the answers across the items and the score of total scale was the sum of the

scores obtained for each subscale and dividing by 5. For all subscale scores and for Total MTSOCS Score, greater values signify a higher presence of that dimension.

In the original study [285], the reliability of membership subscale was $\alpha = 0.80$ (this study $\alpha = 0.75$); the reliability of shared influence subscale was $\alpha = 0.61$ (this study $\alpha = 0.44$); the reliability of help in case of need subscale was $\alpha = 0.69$ (this study $\alpha = 0.73$); the reliability of social climate and bonds subscale was $\alpha = 0.75$ (this study $\alpha = 0.65$); the reliability of needs and fulfillments subscale was $\alpha = 0.71$ (this study $\alpha = 0.77$); and the reliability of Total MTSOCS Score was $\alpha = 0.88$ (this study $\alpha = 0.88$).

Perceptions of Peer Helping Norms

Perceptions of Peer Helping scale(PPH) [31] was used to evaluate participants' perceptions of peers as prosocial and helpful bystanders.

PPH is a 5-point scale (1= not at all likely, 5= extremely likely) composed by 20 items that measures how likely participants' friends might act a series of helping behaviors.

The scale has the following instructions: "Please use the following scale to rate how likely your friends are to do each of the following behaviors." Sample items include: "Speak up to someone who is making excuses for using physical force in a relationship.", and "Approach a friend if they thought s/he was in an abusive relationship to let them know they were there to help.".

A total score was created by calculating the mean across the items (range from 1 to 5), with higher score points out greater prosocial perceptions of their friends. The original English version of the scale was translated into Italian, Portuguese, and French, and then reported in the original language (back translation).

Cronbach's alpha for this scale was 0.95 [31], and in the current study was 0.92 for the full sample.

Intent to Help

Brief Intent to Help Scale (BIH) [31] was used to assess participants' intention to engage in different helpful bystander behaviors with a friend and a stranger.

BIH is a 5-point scale (1= not at all likely, 5= extremely likely) that measures the likelihood of a bystander to engage in several helping behaviors

in situations of sexual assault or IPV. The BIH is composed by two subscales: 10 items are related to helping a friend (e.g., "I approach someone I know if I thought they were in an abusive relationship and let them know I'm here to help.") and 8 items are related to helping a stranger (e.g., "I approach someone I don't know if I thought they were in an abusive relationship and let them know that I'm here to help"), for a total of 18 items. This measure was developed from a previous version of intention to help scale [26].

The score of both subscales was obtained by calculating the average of the answers across the items (range from 1 to 5), and greater scores signify higher likelihood to engage in bystander behaviors.

The original English version of the scale was translated into Italian, Portuguese, and French, and then reported in the original language (back translation).

Cronbach's alpha was of 0.93 for the Brief Intent to Help Friends, and of 0.94 for the Brief Intent to Help Strangers [31]. In the current study, for the full sample, the Cronbach's alphas was of 0.80 and 0.85 for friends and strangers respectively.

5.2.4 Data Analysis

Quantitative analyses have been developed, using SPSS 23.0. In order to answer the main research questions and hypothesis, firstly, descriptive data for all sample and each subsample will be presented, showing possible differences between countries of data collection by means of crosstab differences (Chi-square) and one-way ANOVA tests.

Later, univariate analysis such as correlations and General linear model (GLM) ANOVA will be used to explore the relation and impact of continuous and not continuous variables on dependent variables (i.e., intent to help a friend and a stranger).

Finally, multivariate analysis such as GLM model (two-way ANCOVA) will be conducted to examine the sets of factors that are related to the intent to help a friend and a stranger involved in sexual assault and IPV situations in the total sample and in the three different countries

Generally, in order to execute the statistical analysis the original sample has been evaluated, excluding incomplete, missing or outlier cases.

5.3   Results

5.3.1   Descriptive Statistics and Differences between Subsamples

Results indicated that 66.7% of all sample had indirect experience of IPV during adulthood, 40.1% experienced traumatic event about violence during the childhood, and 52.9% had knowledge/training about IPV.

As shown in Table 5.1, there were significant relationships between the countries of data collection and indirect experience of IPV during adulthood ($\chi^2 = 74.033, p < .001$; df = 2), childhood experiences of interpersonal violence ($\chi^2 = 136.476, p < .001$; df = 2), and knowledge/training about IPV ($\chi^2 = 52.527, p < .001$; df = 2).

About indirect experience of IPV during adulthood, there was a significant difference between Italian and Brazilian students with the latter had more likelihood of knowing someone in a violent relationship or being a witness of IPV (84.8%) than Italian counterparts (52.9%).

As childhood experiences of interpersonal violence, there was a significant difference between Italian, Canadian and Brazilian participants. Brazilian students were more likely to be a victim of this issue (66.1%) compared to Canadian (35.7%) and Italian students (21.3%).

With regard to the knowledge/training about IPV, there was a significant difference between Italian, Canadian and Brazilian participants. Brazilian students were more likely to have more knowledge/training about IPV (70.2%) compared to Canadian (49%) and Italian students (42.9%).

Table 5.2 shows the descriptive statistics of the study quantitative variables of all the sample. Moreover, this table also displayed the results of one-way between-groups analysis of variance (ANOVA) that explore country differences.

About sense of community, Brazilian participants significantly differed from Italian and Canadian counterparts, showing lower scores of membership (M= 2.603, SD= 0.668) and social climate and bonds (M= 2.630, SD= 0.470) dimensions than Italian (membership: M= 2.838, SD= 0.618; social climate and bonds: M= 2.900, SD= 0.450) and Canadian participants (membership: M= 2.841, SD= 0.597; social climate and bonds: M= 2.911, SD= 0.499). Instead, Canadian students significantly differed from Italian and Brazilian counterparts, reporting greater values of shared influence dimensions (M= 2.785, SD= 0.464) than Italian (M= 2.592, SD= 0.474) and

Table 5.1: Contingency Tables and Chi-Square Values among Countries of Data Collection and Indirect Experience of IPV during Adulthood, Childhood Experiences of Interpersonal Violence, and Knowledge/Training about IPV

Variables	Indirect Experience of IPV during Adulthood		Childhood Experiences of Interpersonal Violence		Knowledge/ Training about IPV	
	No	Yes	No	Yes	No	Yes
Countries						
Italy	157 (47.1%)	176 (52.9%)	262 (78.7%)	71 (21.3%)	190 (57.1%)	143 (42.9%)
ASR*	6.6	-6.6	8.6	-8.6	4.3	-4.3
Brazil	46 (15.2%)	256 (84.8%)	102 (33.9%)	199 (66.1%)	90 (29.8%)	212 (70.2%)
ASR*	-8.8	8.8	-11.0	11.0	-7.0	7.0
Canada	123 (35.7%)	222 (64.3%)	222 (64.3%)	123 (35.7%)	247 (51.0%)	237 (49.0%)
ASR*	1.2	-1.2	2.1	-2.1	2.3	-2.3
Chi-square	74.033***		136.476***		52.572***	

$***p < 0.001$

Brazilian students (M= 2.544, SD= 0.516).

Moreover, Canadian, Brazilian and Italian university students significantly differed in help in case of need dimension with Brazilian participants showed the lowest values (M= 2.346, SD= 0.484), followed by Italian (M= 2.532, SD= 0.480) and Canadian participants (M= 2.827, SD= 0.487). They also significantly differed in needs and fulfillments with Italian participants showed the smallest scores (M= 2.643, SD= 0.629) than Brazilian (M= 2.904, SD= 0.651) and Canadian students (M= 3.067, SD= 0.563).

The total score of MTSOCS was significantly different in the three subsamples with highest values for Canadian participants (M= 2.892, SD= 0.413), followed by Italian (M= 2.707, SD= 0.394) and Brazilian counterparts (M= 2.609, SD= 0.419).

As self-efficacy to deal with violence, one-way ANOVA tests showed that Brazilian, Canadian and Italian subsamples significantly varied in the case of the specific self-efficacy as bystander with Italian participants reported the lowest values (M= 16.469, SD= 2.365), followed by Canadian (M= 16.922, SD= 2.604) and Brazilian counterparts (M= 17.739, SD= 2.041). Moreover, Brazilian students significantly differed by Italian and Canadian students in self-efficacy about help-seeking behaviors as a victim or a perpetrator (Brazil: M= 9.805, SD= 1.749; Italy: M= 9.312, SD= 1.702; Canada: M= 9.082, SD= 1.829). Also in the case of self-efficacy to deal with violence (i.e., total score), Brazilian students (M= 27.545, SD= 3.285) significantly differed from Canadian (M= 25.998, SD= 3.694) and Italian students (M= 25.781, SD= 3.497).

About generalized self-efficacy, one-way ANOVA indicated that Canadian participants (M= 3.210, SD= 0.505) significantly differed by Italian (M= 2.892, SD= 0.452) and Brazilian participants (M= 2.821, SD= 0.458).

Concerning domestic violence myth acceptance, one-way ANOVA found a significant difference between Italian, Canadian and Brazilian students, showing how Italian participants were more likely to support domestic violence myth acceptance (M= 2.480, SD= 0.764) compared to Canadian (M= 2.134, SD= 0.756) and Brazilian counterparts (M= 1.791, SD= 0.787).

Finally, Italian participants differed by Canadian and Brazilian participants on perceptions of peer helping norms. The first (M= 3.1955, SD= 0.603) perceived their friends as less prosocial in sexual assault and IPV situations than Canadian (M= 3.661, SD= 0.622) and Brazilian students (M= 3.572, SD= 0.754).

5.3.2 Inferential Analysis: Univariate

Pearson's *r* Correlations

Table 5.2 shows the Pearson's *r* correlations between the study continuous variables and the dependent variables (i.e., intent to help a friend and a stranger).

In general, the intention of helping a friend showed a higher mean score and stronger correlations with all the variables under investigation compared to the intention to help a stranger.

In particular, the total Multidimensional Sense of Community scale (MT-SOCS) score and its subscales were more associated with the intent to help a friend than a stranger. However, the significant positive correlations among these variables were small.

With regard to Self-efficacy to Deal with Violence scale (SEDVS), the perception of being able to address the IPV as a bystander had a higher positive correlation with both the intention to help a friend and a stranger, than the help-seeking behaviors as victim or aggressor. Also, the Generalized Self-efficacy scale (GSE) was positively associated with both the intent to help a friend and a stranger, but with less strength compared to the SEDVS.

Other high positive correlations were found among the Perceptions of Peer Helping scale (PPH) and both the intent to help a friend and a stranger.

Negative correlations were found among the acceptance of domestic violence myths (DVMAS) and both the intent to help a friend and a stranger.

Other negative small correlations were found between the intent to help a friend and the buck-passing, procrastination and hypervigilance decision-making styles, and among intent to help a stranger and vigilance and buck-passing decision-making styles.

General Linear Model: Relation between Continuous Variable and Dummy Variable

General linear models (ANOVA) were conducted to explore the impact of non continuous variables such as Countries, Gender, Indirect experience of IPV during adulthood, Childhood traumatic events about violence and Knowledge/Training about IPV on the Intention to Help a Friend and a Stranger.

In almost all cases, where there were significant differences between variables, the magnitude of the differences (eta squared = η^2) were stronger for the Intention to Help a Stranger than a Friend.

Table 5.2: Descriptive Statistics and Correlations among Study Variables

	Intent to help a Friend M = 4.114 SD = 0.617 Skewness = -0.849 Kurtosis = 1.213[1]	Intent to help a Stranger M = 2.717 SD = 0.922 Skewness = 0.311 Kurtosis = -0.571	M	SD	Skewness	Kurtosis	F (One-way ANOVA)
MTSOCS							
Membership	0.045	- 0.013	2.776	0.631	-0.394	-0.035	15.982***
Shared Influence	0.096**	0.033	2.663	0.493	-0.278	0.736	28.641***
Help in case of Need	0.102**	0.070*	2.610	0.524	-0.194	0.062	98.756***
Social Climate and Bonds	0.128**	0.014	2.833	0.506	-0.481	0.823	35.079***
Need Fulfillment	0.139**	0.083**	2.898	0.632	-0.548	0.147	48.239***
Total scale	0.134**	0.053	2.761	0.426	-0.441	0.857	49.137***
SEDVS							
Witness	0.462**	0.319**	17.009	2.437	-0.868	1.239[1]	22.982***
Victim or Aggressor	0.268**	0.219**	9.349	1.793	-0.523	0.241	15.527***
Total scale	0.455**	0.325**	26.355	3.600	-0.725	1.263[1]	24.066***
GSE: Total scale	0.210**	0.142**	3.013	0.505	-0.122	-0.138	67.067***
DVMAS: Total Scale	- 0.287**	- 0.254**	2.145	0.811	1.041[1]	1.513[1]	64.061***
MDMQ							
Vigilance	0.036	- 0.065*	10.149	2.091	-1.378[1]	1.877[1]	14.313***
Buck-passing	- 0.161**	- 0.137**	4.175	3.026	0.557	-0.338	10.690***
Procrastination	- 0.202**	- 0.058	3.480	2.338	0.489	-0.179	14.447***
Hypervigilance	- 0.143**	- 0.050	4.769	2.477	0.149	-0.630	12.349***
PPH: Total scale	0.490**	0.427**	3.4778	0.689	-0.254	-0.194	47.498***

Note. MTSOCS = Multidimensional Sense of Community scale; SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale.
[1] The distributions of the following variables have been transformed by means of Logarithmic function to achieve a Gaussian distribution.
$*p < 0.05$; $**p < 0.01$ $***p < 0.001$

Below the results of the analysis for each variable under investigation compared to the Intention to Help a Friend or a Stranger.

1. Countries and Intent to Help a Friend and a Stranger. With regard the variables Countries and Intent to Help a Friend, there was a significant difference in the intention of helping a friend and the three countries [$F(2, 1057) = 19.162$, $p < 0.001$]. However, the eta squared was quite small ($\eta^2 = 0.035$).

As shown in Fig. 5.7 (a), Post hoc comparison using Scheffé' test showed that there was no mean score difference between Brazil and Canada. The Italian participants showed the smallest mean score (M = 3.944, SD = 0.596) which was significantly different from Brazilian mean score (M = 4.193, SD = 0.703) and Canadian mean score (M = 4.114, SD = 0.617).

With regard the variables countries and intent to help a stranger, there was also a significant difference in Intent to Help a Stranger scores and the three countries [$F(2, 1057) = 38.953$, $p < 0.001$]. The eta squared was moderate ($\eta^2 = 0.069$).

As the Intent to Help a Friend, the Scheffé' test showed that Italy (M = 2.362, SD = 0.796) was significantly different from Brazil (M = 2.851, SD = 0.953) and Canada (M = 2.902, SD = 0.922), showing the smallest mean score. Brazilian and Canadian participants did not differ significantly from each other (see Fig. 5.7 (b)).

2. Gender and Intent to Help a Friend and a Stranger. About the relation between Intent to Help a Friend and Gender, there was a significantly difference in scores [$F(1,1055) = 76.218$; $p < 0.001$] for females (M = 4.243, SD = 0.585) and males (M = 3.915, SD = 0.614), with female participants were more likely to report higher intent to help a friend than male participants. The magnitude of the difference was moderate ($\eta^2 = 0.067$).

Also in the case of the Intent to Help a Stranger, there was a significantly difference in scores [$F(1,1055) = 82.079$; $p < 0.001$] for females (M = 2.914, SD = 0.918) and males (M = 2.714, SD = 0.837), and the eta squared was medium (0.072).

3. Indirect Experience of IPV and Intent to Help a Friend and a Stranger. With reference to the Intent to Help a Friend, those who have not indirect experience of IPV (M = 3.993, SD = 0.614) were less likely
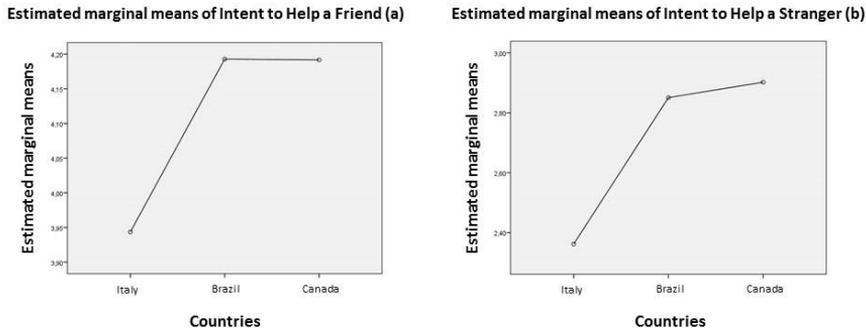
Figure 5.7: (a) Difference among Italy, Brazil, and Canada of estimated marginal means of Intent to Help a Friend. (b) Difference among Italy, Brazil, and Canada of estimated marginal means of Intent to Help a Stranger.

to help $[F(1,980) = 18.424; p < 0.001]$ compared to those who have (M = 4.172, SD = 0.616), even if the magnitude of the difference was quite small ($\eta^2 = 0.018$).

In the case of the Intent to Help a Stranger, there was also a significantly difference in scores $[F(1,980) = 39.625; p < 0.001]$ for those who have not indirect experience of IPV (M = 2.453, SD = 0.871) and those who have indirect experience of IPV (M = 2.841, SD = 0.929). Knowing someone in a violent relationship or being a witness of IPV had more likelihood to help a stranger than individuals who had not these indirect experience of IPV. In this case, the eta squared is bigger than the intent to help a friend but it was still small ($\eta^2 = 0.039$).

4. Childhood Experiences of Interpersonal Violence and Intent to Help a Friend and a Stranger. Participants with childhood experiences of interpersonal violence were more likely to help a friend [M = 4.193, SD = 0.624; F$(1,979) = 11.050$, $p < 0.001$] and a stranger [M = 2.910, SD = 0.905; F$(1, 979) = 30.527$, $p < 0.001$] than participants who did not experiences this kind of events (Intent to Help a Friend: M = 4.059, SD = 0.613; Intent to Help a Stranger: M = 2.581, SD = 0.921).

However, the magnitude of the differences was small (eta squared Intent to Help a Friend = 0.011; eta squared Intent to Help a Stranger = 0.030).

5. Knowledge/Training about IPV and Intent to Help a Friend and a Stranger. People that had previous knowledge/training about IPV [M = 4.246, SD = 0.570; F(1,1051) = 59.802, $p < 0.001$] were more likely to help a friend than participants who had not (M = 3.959, SD = 0.634). Moreover, the eta squared was almost moderate ($\eta^2 = 0.054$).

With regard to the intent to help a stranger, individuals that had previous knowledge/training about IPV [M = 2.968, SD = 0.921; F(1,1051) = 98.721, $p < 0.001$] were more likely to help than participants who had not (M = 2.427, SD = 0.857), and the eta squared was moderate ($\eta^2 = 0.086$).

5.3.3 Inferential Analysis: Multivariate

The previous analyses (see section 5.3.2) have shown that different variables are in relation with the intent to help a friend or a stranger in situations of sexual assault or IPV (i.e., dependent variables).

By means of General Linear Model Univariate method, we conducted a two-way ANCOVA and we tested which factors (i.e., categorical independent variables) and covariates (i.e., continuous variables) are predictors of the dependent variables (e.g., intent to help a friend and a stranger).

For the intent to help a friend, we chose as categorical variables only the variables with a medium eta squared (i.e., $\eta^2 => .06$). As continuous variables, we selected only the variables with Pearson's r correlations more than 0.200 expected for the scale of the self-efficacy to deal with violence that we chose values more than 0.300.

Given that the intent to help a stranger showed less strong correlations with the majority of continuous variables under investigation and it had greater values of eta squared compared to the intention to help a friend (see section 5.3.2), as covariates we chose only the variables with Pearson's r correlations more than 0.100 (expected for the scale of the self-efficacy to deal with violence that we chose values more than 0.300), and as factors, we selected the variables with the higher eta squared (i.e., $\eta^2 => .07$).

Moreover, we conducted a two-way ANCOVA for assessing which factors and covariates are still predictors of the dependent variables in each subsample.

Two-way ANCOVA: Intent to Help a Friend

Results for All Sample. With regard to the intent to help a friend, the predictors entered in the analysis were: gender and knowledge/training about IPV as factors, and self-efficacy to deal with violence as a bystander, generalized self-efficacy, domestic violence myth acceptance, perceptions of peer helping behaviors and procrastination decision-making style as scale variables.

As shown in Table 5.3, there was not a significant interaction effect ($p = 0.080$) between gender and knowledge/training about IPV (see Fig. 5.8 (c)) but the main effects of these variables were significant [gender: $F(1, 988) = 22.995, p < 0.001$; knowledge/training about IPV: $F(1, 988) = 9.758, p < 0.01$] (see Fig. 5.8 (a) and (b)), with small partial eta squared [gender: $\eta_p^2 = 0.023$; knowledge/training about IPV: $\eta_p^2 = 0.010$].

As shown in Table 5.4, female participants were more likely to help a friend in situations of sexual assault or IPV ($B = 0.104, p < 0.05$), and participants with no knowledge/training about IPV were less likely to help a friend ($B = -0.161, p < 0.01$).

Moreover, all the covariates had a significant relationship with the intent to help a friend (see Table 5.3).

Participants' perception of peer helping behavior (PPH) explained the 12.6% of the variance in the dependent variable [$\eta_p^2 = 0.126$; $F(1, 988) = 141.578, p < 0.001$]. In particular, participants that perceived their friends as helpful bystanders were more likely to help a friend ($B = 0.293, p < 0.001$; see Table 5.4).

Participants with a higher self-efficacy to deal with violence as a bystander were more likely to help a friend [$\eta_p^2 = 0.103$; $F(1, 988) = 112.814, p < 0.001$; $B = 0.076, p < 0.001$]. Moreover, individuals with higher general self-efficacy (GSE) were more likely to help a friend ($B = 0.080, p < 0.05$), but the partial eta squared was very small [$\eta_p^2 = 0.005$; $F(1, 988) = 5.285, p < 0.05$] (see Table 5.3 and 5.4).

Finally, the domestic violence myth acceptance (DVMAS) and the procrastination decision-making style (MDMQ: Procrastination) had a negative significant relationship with the dependent variable [DVMAS: $F(1, 988) = 5.046, p < 0.05$; $B = -0.048, p < 0.05$; MDMQ(Procrastination): $F(1, 988) = 16.858, p < 0.001$; $B = -0.029, p < 0.001$], with both a small partial eta squared [DVMAS: $\eta_p^2 = 0.005$; MDMQ(procrastination): $\eta_p^2 = 0.017$] (see Table 5.3 and 5.4). Participants with higher domestic vi-
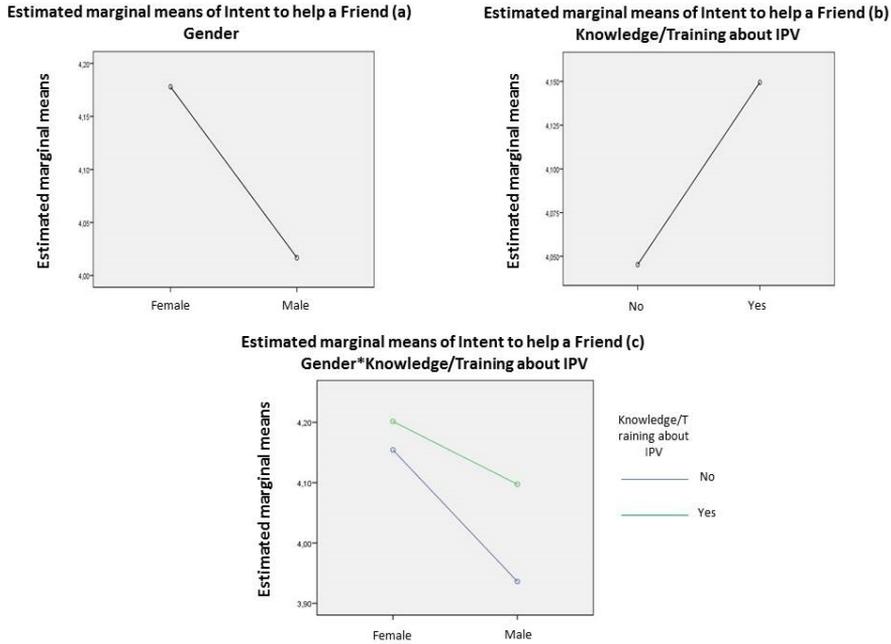
Figure 5.8: (a) Gender differences of estimated marginal means of Intent to Help a Friend (Main effect). (b) Difference between knowledge/training about IPV of estimated marginal means of Intent to Help a Friend (Main effect). (c) Interaction effect between gender and knowledge/training about IPV of estimated marginal means of Intent to Help a Friend.

olence myth acceptance and more procrastination decision-making style are less likely to help a friend.

Results for Each Subsample. Tables 5.5, 5.6, 5.7, 5.8, 5.9, and 5.10 report the results from two-way ANCOVA tests by each sample. Generally, the intent to help a friend was affected by more similar than distinctive variables among the countries of data collection.

For instance, higher perception of peer helping norms as prosocial and greater self-efficacy to deal with violence as a bystander were positively associated with Italian [PPH: $F(1, 333) = 36.421, p < 0.001$; SEDVS: Witness: $F(1, 333) = 26.476, p < 0.001$], Brazilian [PPH: $F(1, 302) =$

$42.193, p < 0.001$; SEDVS: Witness: $F(1, 302) = 55.824, p < 0.001$], and Canadian [PPH: $F(1, 353) = 58.009, p < 0.001$; SEDVS: Witness: $F(1, 353) = 32.710, p < 0.001$] participants' intent to help a friend.

Gender only influenced Brazilian [$F(1, 302) = 10.401, p < 0.001$] and Canadian [$F(1, 353) = 10.770, p < 0.001$] students' intent to help a friend. However, Tables 5.8, and 5.10 report only significant gender parameter for Canadian students with females who were more inclined to help a friend.

Instead, procrastination decision-making style only negative affected Brazilian [$F(1, 302) = 15.561, p < 0.001$; $B = -0.054, p < 0.001$] and Italian [$F(1, 333) = 5.604, p < 0.05$; $B = -0.037, p < 0.05$] participants' intent to help a friend, with individuals who more postpone decisions were less likely to help a friend.

Generalized self-efficacy only positive influenced the intent to help a friend for Canadian participants [$F(1, 353) = 6.833, p < 0.01$; $B = 0.135, p < 0.01$].

As shown in Tables 5.5, 5.7, and 5.9, the perception of peer helping norms was the variable that most explained the variance in the dependent variable for Italian (PPH: $\eta_p^2 = 0.101$; SEDVS: Witness: $\eta_p^2 = 0.076$) and Canadian students (PPH: $\eta_p^2 = 0.144$; SEDVS: Witness: $\eta_p^2 = 0.087$), while for Brazilian students it was the self-efficacy to deal with violence as a bystander (PPH: $\eta_p^2 = 0.126$; SEDVS: Witness: $\eta_p^2 = 0.160$).

Comparing with the results of all the sample, these results showed that domestic violence myth acceptance and knowledge/training about IPV seem to not affected anymore the intent to help a friend (see Tables 5.5, 5.7, and 5.9).

Except that the results for the Italian subsample, the R-squared in the separate subsamples was higher than in all sample, registering 0.458 and 0.414 for Brazilian and Canadian participants, respectively (see Tables 5.3, 5.5, 5.7, and 5.9).

Two-way ANCOVA: Intent to Help a Stranger

Results for All Sample. With regard to the intent to help a stranger, the predictors entered in the analysis were: gender and knowledge/training about IPV as factors, and self-efficacy to deal with violence as a bystander, general self-efficacy, domestic violence myth acceptance, perceptions of peer helping behaviors and buck-passing decision-making style as scale variables.

As shown in Table 5.11, there was a significant interaction effect

Table 5.3: Test of Between-Subject Effects Intent to Help a Friend

Dependent Variable: Intent to Help a Friend

Source	Type III Sum of Square	df	Mean Square	F	Sig.	Partial Eta Squared (η_p^2)
Corrected Model	153.534[a]	8	19.192	82.177	< 0.001	0.402
Intercept	25.212	1	25.212	107.956	< 0.001	0.099
SEDVS: Witness	26.347	1	26.347	112.814	< 0.001	0.103
GSE: Total scale	1.234	1	1.234	5.285	0.022	0.005
DVMAS: Total Scale	1.178	1	1.178	5.046	0.025	0.005
PPH: Total scale	33.064	1	33.064	141.578	< 0.001	0.126
MDMQ: Procrastination	3.937	1	3.937	16.858	< 0.001	0.017
Gender	5.370	1	5.370	22.995	< 0.001	0.023
Knowledge/Training about IPV	2.279	1	2.279	9.758	0.002	0.010
Gender*Knowledge/Training about IPV	0.717	1	0.717	3.070	0.080	0.003
Error	228.636	979	0.234			
Total	17072.094	988				
Corrected Total	382.170	987				

Note. [a] R Squared = 0.402 (Adjusted R Squared = 0.397). SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale.

Table 5.4: Estimate of Parameters Intent to Help a Friend

Dependent Variable: Intent to Help a Friend

Parameters	B	Std. Error	t	Sig.	95% C.I.		Partial Eta Squared η_p^2
					Lower	Upper	
Intercept	1.747	0.172	10.146	< 0.001	1.409	2.084	0.095
SEDVS: Witness	0.076	0.007	10.621	< 0.001	0.062	0.090	0.103
GSE: Total scale	0.080	0.035	2.299	0.022	0.012	0.149	0.005
DVMAS: Total Scale	- 0.048	0.021	-2.246	0.025	- 0.090	- 0.006	0.005
PPH: Total scale	0.293	0.025	11.899	< 0.001	0.245	0.342	0.126
MDMQ: Procrastination	- 0.029	0.007	-4.106	< 0.001	- 0.043	- 0.015	0.017
Gender(F)	0.104	0.047	2.215	0.027	0.012	0.196	0.005
Knowledge/Training about IPV(No)	- 0.161	0.051	-3.190	0.001	- 0.260	- 0.062	0.010
Gender(F)*Knowledge/Training about IPV(No)	0.114	0.065	1.752	0.080	- 0.014	0.242	0.003

Note. SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale. The table shows the model's coefficients [B], their standard errors [Std. Error], t statistics [t], p-values [Sig.], and their confidence interval [95% C.I.].

Table 5.5: Test of Between-Subject Effects Intent to Help a Friend (Italian Subsample)

Dependent Variable: Intent to Help a Friend

Source	Type III Sum of Square	df	Mean Square	F	Sig.	Partial Eta Squared (η_p^2)
Corrected Model	37.649[a]	8	4.706	19.000	< 0.001	0.319
Intercept	8.937	1	8.937	36.081	< 0.001	0.100
SEDVS: Witness	6.558	1	6.558	26.476	< 0.001	0.076
GSE: Total scale	0.139	1	0.139	0.562	0.454	0.002
DVMAS: Total Scale	0.006	1	0.006	0.023	0.879	0.000
PPH: Total scale	9.021	1	9.021	36.421	< 0.001	0.101
MDMQ: Procrastination	1.388	1	1.388	5.604	0.019	0.017
Gender	0.684	1	0.684	2.762	0.098	0.008
Knowledge/Training about IPV	0.943	1	0.943	3.806	0.052	0.012
Gender*Knowledge/Training about IPV	0.603	1	0.603	2.436	0.120	0.007
Error	80.250	324	0.248			
Total	5296.560	333				
Corrected Total	117.899	332				

Note. [a] R Squared = 0.319 (Adjusted R Squared = 0.303). SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale.

Table 5.6: Estimate of Parameters Intent to Help a Friend (Italian Subsample)

Dependent Variable: Intent to Help a Friend

Parameters	B	Std. Error	t	Sig.	95% C.I.		Partial Eta Squared η_p^2
					Lower	Upper	
Intercept	1.918	0.318	6.028	< 0.001	1.292	2.545	0.101
SEDVS: Witness	0.067	0.013	5.145	< 0.001	0.041	0.092	0.076
GSE: Total scale	0.055	0.074	0.750	0.454	- 0.090	0.200	0.002
DVMAS: Total Scale	0.006	0.039	0.152	0.879	- 0.070	0.082	0.000
PPH: Total scale	0.295	0.049	6.035	< 0.001	0.199	0.391	0.101
MDMQ: Procrastination	- 0.037	0.015	-2.367	0.019	- 0.067	- 0.006	0.017
Gender(F)	0.011	0.096	0.111	0.912	- 0.179	0.200	0.000
Knowledge/Training about IPV(No)	- 0.212	0.092	-2.306	0.022	- 0.392	- 0.031	0.016
Gender(F)*Knowledge/Training about IPV(No)	0.189	0.121	1.561	0.120	- 0.049	0.427	0.007

Note. SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale. The table shows the model's coefficients [B], their standard errors [Std. Error], t statistics [t], p-values [Sig.], and their confidence interval [95% C.I.].

Table 5.7: Test of Between-Subject Effects Intent to Help a Friend (Brazilian Subsample)

Dependent Variable: Intent to Help a Friend

Source	Type III Sum of Square	df	Mean Square	F	Sig.	Partial Eta Squared (η_p^2)
Corrected Model	68.394[a]	8	8.549	30.970	< 0.001	0.458
Intercept	2.478	1	2.478	8.976	0.003	0.030
SEDVS: Witness	15.410	1	15.410	55.824	< 0.001	0.160
GSE: Total scale	0.176	1	0.176	0.636	0.426	0.002
DVMAS: Total Scale	0.980	1	0.980	3.550	0.061	0.012
PPH: Total scale	11.647	1	11.647	42.193	< 0.001	0.126
MDMQ: Procrastination	4.296	1	4.296	15.561	< 0.001	0.050
Gender	2.871	1	2.871	10.401	0.001	0.034
Knowledge/Training about IPV	0.647	1	0.647	2.344	0.127	0.008
Gender*Knowledge/Training about IPV	0.403	1	0.403	1.458	0.228	0.005
Error	80.882	293	0.276			
Total	5458.464	302				
Corrected Total	149.275	301				

Note. [a] R Squared = 0.458 (Adjusted R Squared = 0.443). SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale.

Table 5.8: Estimate of Parameters Intent to Help a Friend (Brazilian Subsample)

Dependent Variable: Intent to Help a Friend

Parameters	B	Std. Error	t	Sig.	95% C.I.		Partial Eta Squared η_p^2
					Lower	Upper	
Intercept	1.112	0.384	2.899	0.004	0.357	1.867	0.028
SEDVS: Witness	0.126	0.017	7.472	< 0.001	0.093	0.159	0.160
GSE: Total scale	0.060	0.075	0.798	0.426	- 0.088	0.207	0.002
DVMAS: Total Scale	- 0.086	0.046	-1.884	0.061	- 0.176	0.004	0.012
PPH: Total scale	0.281	0.043	6.496	< 0.001	0.196	0.366	0.126
MDMQ: Procrastination	- 0.054	0.014	-3.945	< 0.001	- 0.081	- 0.027	0.050
Gender(F)	0.144	0.076	1.902	0.058	- 0.005	0.294	0.012
Knowledge/Training about IPV(No)	- 0.189	0.095	-1.984	0.048	- 0.376	- 0.001	0.013
Gender(F)*Knowledge/Training about IPV(No)	0.165	0.136	1.208	0.228	- 0.104	0.433	0.005

Note. SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale. The table shows the model's coefficients [B], their standard errors [Std. Error], t statistics [t], p-values [Sig.], and their confidence interval [95% C.I.].

Table 5.9: Test of Between-Subject Effects Intent to Help a Friend (Canadian Subsample)

Dependent Variable: Intent to Help a Friend

Source	Type III Sum of Square	df	Mean Square	F	Sig.	Partial Eta Squared (η_p^2)
Corrected Model	41.822[a]	8	5.228	82.177	< 0.001	0.414
Intercept	8.891	1	8.891	51.626	< 0.001	0.130
SEDVS: Witness	5.633	1	5.633	32.710	< 0.001	0.087
GSE: Total scale	1.177	1	1.177	6.833	0.009	0.019
DVMAS: Total Scale	0.311	1	0.311	1.808	0.180	0.005
PPH: Total scale	9.990	1	9.990	58.009	< 0.001	0.144
MDMQ: Procrastination	0.174	1	0.174	1.010	0.316	0.003
Gender	1.855	1	1.855	10.770	0.001	0.030
Knowledge/Training about IPV	0.329	1	0.329	2.275	0.132	0.007
Gender*Knowledge/Training about IPV	8.073E-5	1	8.073E-5	0.000	0.983	0.000
Error	59.243	344	0.172			
Total	6317.070	353				
Corrected Total	101.065	352				

Note. [a] R Squared = 0.414 (Adjusted R Squared = 0.400). SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale.

Table 5.10: Estimate of Parameters Intent to Help a Friend (Canadian Subsample)

Dependent Variable: Intent to Help a Friend

Parameters	B	Std. Error	t	Sig.	95% C.I. Lower	95% C.I. Upper	Partial Eta Squared η_p^2
Intercept	1.772	0.263	6.725	< 0.001	1.253	2.290	0.116
SEDVS: Witness	0.056	0.010	5.719	< 0.001	0.037	0.075	0.087
GSE: Total scale	0.135	0.052	2.614	0.009	0.033	0.236	0.019
DVMAS: Total Scale	- 0.044	0.032	-1.345	0.180	- 0.107	0.020	0.005
PPH: Total scale	0.296	0.039	7.616	< 0.001	0.219	0.372	0.144
MDMQ: Procrastination	- 0.010	0.010	-1.005	0.316	- 0.031	0.010	0.003
Gender(F)	0.175	0.082	2.134	0.034	0.014	0.336	0.013
Knowledge/Training about IPV(No)	- 0.081	0.088	- 0.912	0.362	- 0.255	0.093	0.002
Gender(F)*Knowledge/Training about IPV(No)	0.002	0.104	0.022	0.983	- 0.202	0.206	0.000

Note. SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale. The table shows the model's coefficients [B], their standard errors [Std. Error], t statistics [t], p-values [Sig.], and their confidence interval [95% C.I.].

$[F(1, 986) = 4.307, p = 0.038]$ between gender and knowledge/training about IPV (see Fig. 5.8 (c)), with a very small partial eta squared $(\eta_p^2 = 0.004)$. The main effects of these variables were also significant [gender: $F(1, 986) = 23.789, p < 0.001$; knowledge/training about IPV: $F(1, 986) = 39.537, p < 0.001$] (see Fig. 5.8 (a) and (b)), with small partial eta squared [gender: $\eta_p^2 = 0.024$; knowledge/training about IPV: $\eta_p^2 = 0.039$].

As covariates, Table 5.11 shows that there were not significant relationships between the intent to help a stranger and the domestic violence myth acceptance (DVMAS) and the buck-passing decision-making style (MDMQ).

The other covariates, instead, had a significant relationship with the intent to help a stranger. As intent to help a friend, participants' perception of peer helping behavior (PPH) explained the most variance in the dependent variable [$\eta_p^2 = 0.090$; $F(1, 986) = 96.433, p < 0.001$]. In particular, participants that perceived their friends as prosocial and helpful bystanders were more likely to help a stranger ($B = 0.392, p < 0.001$; see Table 5.12).

Finally, participants with higher generalized self-efficacy [$\eta_p^2 = 0.005$; $F(1, 986) = 4.459, p < 0.05$; $B = 0.121, p < 0.05$] and self-efficacy to deal with violence as bystander [$\eta_p^2 = 0.026$; $F(1, 986) = 25.795, p < 0.001$; $B = 0.059, p < 0.001$] had more likelihood to help a stranger (see Table 5.11 and 5.12).

Results for Each Subsample. Tables 5.13, 5.14, 5.15, 5.16, 5.17, and 5.18 show the results from two-way ANCOVA tests by each sample. As intent to help a friend, also in this case the intent to help a stranger was influenced by more similar than distinctive variables among the countries of data collection.

Perception of peer helping norms and knowledge/training about were two variables associated with Italian [PPH: $F(1, 333) = 36.404, p < 0.001$; Knowledge/Training about IPV: $F(1, 333) = 6.130, p < 0.05$], Brazilian [PPH: $F(1, 300) = 9.293, p < 0.01$; Knowledge/Training about IPV: $F(1, 300) = 15.559, p < 0.001$], and Canadian [PPH: $F(1, 353) = 49.096, p < 0.001$; Knowledge/Training about IPV: $F(1, 353) = 14.652, p < 0.001$] participants' intent to help a stranger. As shown in Tables 5.14, 5.16, and 5.18, in each subsample, higher perception of peer helping norms as prosocial was positively associated with participants' intent to help a stranger and not having knowledge/training about IPV negatively influenced students' intent to help a stranger.

Self-efficacy to deal with violence as a bystander only positively influenced Brazilian [$F(1,300) = 26.123, p < 0.001$; $B = 0.129, p < 0.001$] and Canadian [$F(1,353) = 9.319, p < 0.01$; $B = 0.056, p < 0.01$] participants' to help a stranger. However, generalized self-efficacy positively influenced the intent to help a stranger for Italian participants [$F(1,333) = 8.312, p < 0.01$; $B = 0.300, p < 0.01$].

Gender only influenced Brazilian [$F(1,300) = 15.559, p < 0.001$] and Canadian [$F(1,353) = 10.034, p < 0.01$] students' intent to help a stranger. However, Tables 5.16, and 5.18 show only a significant gender parameter for Brazilian subsample with females reported more likelihood to help a stranger.

Likewise the intent to help a friend, perception of peer helping norms was the variable that most explained the variance of the dependent variable for Italian (PPH: $\eta_p^2 = 0.101$; SEDVS: Witness: $\eta_p^2 = 0.000$) and Canadian students (PPH: $\eta_p^2 = 0.125$; SEDVS: Witness: $\eta_p^2 = 0.026$). For Brazilian students (PPH: $\eta_p^2 = 0.031$; SEDVS: Witness: $\eta_p^2 = 0.082$), self-efficacy to deal with violence as a bystander was the variable that most explained the variance of intent to help a stranger.

Comparing with the results of all sample, these findings removed the interaction effect between gender and knowledge/training about IPV and the buck-passing decision-making style became a significant variable which negatively affected the Brazilian participants' intent to help a stranger. Moreover, the two-way ANCOVA for each subsample showed R-squared higher than the two-way ANCOVA for all sample, with the exception of Italian subsample (see Tables 5.11, 5.13, 5.15, and 5.17).

5.4 Discussion and Conclusions of Second Research Study

This study sought to identify whether the intention of engaging in helpful bystander behaviors with a friend or with a stranger was affected by similar or different sets of factors, exploring country differences too. Therefore, the results of this study may be summarized in two main parts: the findings relating to all the sample and those concerning each subsample.

As first main part of results, some factors, especially individual and relationship variables, are associated with university students' intent to help a friend and a stranger. In all the sample, the intentions of helping a friend and a stranger were affected by more similar than different sets of factors.

Table 5.11: Test of Between-Subject Effects Intent to Help a Stranger

Dependent Variable: Intent to Help a Stranger

Source	Type III Sum of Square	df	Mean Square	F	Sig.	Partial Eta Squared (η_p^2)
Corrected Model	251.821[a]	8	31.478	51.349	< 0.001	0.296
Intercept	0.187	1	0.187	0.305	0.581	0.000
SEDVS: Witness	15.813	1	15.813	25.795	< 0.001	0.026
GSE: Total scale	2.734	1	2.734	4.459	0.035	0.005
DVMAS: Total Scale	1.651	1	1.651	2.693	0.101	0.003
PPH: Total scale	59.115	1	59.115	96.433	< 0.001	0.090
MDMQ: Buck-passing	2.230	1	2.230	3.638	0.057	0.004
Gender	14.583	1	14.583	23.789	< 0.001	0.024
Training about IPV Knowledge/	24.237	1	24.237	39.537	< 0.001	0.039
Gender*Knowledge/ Training about IPV	2.640	1	2.640	4.307	0.038	0.004
Error	598.915	977	0.613			
Total	8108.641	986				
Corrected Total	850.736	985				

Note. [a] R Squared = 0.291 (Adjusted R Squared = 0.287). SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale.

Table 5.12: Estimate of Parameters Intent to Help a Stranger

Dependent Variable: Intent to Help a Stranger

Parameters	B	Std. Error	t	Sig.	95% C.I. Lower	95% C.I. Upper	Partial Eta Squared η_p^2
Intercept	0.243	0.281	0.865	0.387	-0.309	0.795	0.001
SEDVS: Witness	0.059	0.012	5.079	<0.001	0.036	0.082	0.026
GSE: Total scale	0.121	0.057	2.112	0.035	0.009	0.233	0.005
DVMAS: Total Scale	-0.057	0.035	-1.641	0.101	-0.125	0.011	0.003
PPH: Total scale	0.392	0.040	9.820	<0.001	0.314	0.471	0.090
MDMQ: Buck-passing	-0.017	0.009	-1.907	0.057	-0.035	0.001	0.004
Gender(F)	0.157	0.076	2.058	0.040	0.007	0.306	0.004
Knowledge/Training about IPV(No)	-0.450	0.082	-5.481	<0.001	-0.611	-0.289	0.030
Gender(F)*Knowledge/Training about IPV(No)	0.219	0.106	2.075	0.038	0.012	0.426	0.004

Note. SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale. The table shows the model's coefficients [B], their standard errors [Std. Error], t statistics [t], p-values [Sig.], and their confidence interval [95% C.I.].

Table 5.13: Test of Between-Subject Effects Intent to Help a Stranger (Italian Subsample)

Dependent Variable: Intent to Help a Stranger

Source	Type III Sum of Square	df	Mean Square	F	Sig.	Partial Eta Squared (η_p^2)
Corrected Model	42.076^a	8	5.260	10.117	< 0.001	0.200
Intercept	0.010	1	0.010	0.019	0.890	0.000
SEDVS: Witness	0.046	1	0.046	0.089	0.766	0.000
GSE: Total scale	4.322	1	4.322	8.312	0.004	0.025
DVMAS: Total Scale	0.477	1	0.477	0.917	0.339	0.003
PPH: Total scale	18.926	1	18.926	36.404	< 0.001	0.101
MDMQ: Buck-passing	0.002	1	0.002	0.003	0.954	0.000
Gender	0.655	1	0.655	1.260	0.262	0.004
Knowledge/Training about IPV	3.187	1	3.187	6.130	0.014	0.019
Gender*Knowledge/Training about IPV	1.519	1	1.519	2.923	0.088	0.009
Error	168.445	324	0.520			
Total	2068.125	333				
Corrected Total	210.521	332				

Note. ^{a} R Squared = 0.200 (Adjusted R Squared = 0.180). SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale.

Table 5.14: Estimate of Parameters Intent to Help a Stranger (Italian Subsample)

Dependent Variable: Intent to Help a Stranger

Parameters	B	Std. Error	t	Sig.	95% C.I. Lower	95% C.I. Upper	Partial Eta Squared η_p^2
Intercept	0.070	0.452	0.156	0.876	- 0.819	0.959	0.000
SEDVS: Witness	0.006	0.019	0.298	0.766	- 0.031	0.042	0.000
GSE: Total scale	0.300	0.104	2.883	0.004	0.095	0.505	0.025
DVMAS: Total Scale	0.054	0.056	0.958	0.339	- 0.057	0.164	0.003
PPH: Total scale	0.430	0.071	6.034	< 0.001	0.290	0.570	0.101
MDMQ: Buck-passing	- 0.001	0.016	- 0.058	0.954	- 0.031	0.030	0.000
Gender(F)	- 0.047	0.140	- 0.334	0.739	- 0.321	0.228	0.000
Knowledge/Training about IPV(No)	- 0.366	0.133	-2.753	0.006	- 0.627	- 0.104	0.023
Gender(F)*Knowledge/Training about IPV(No)	0.300	0.175	1.710	0.088	- 0.045	0.644	0.009

Note. SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale. The table shows the model's coefficients [B], their standard errors [Std. Error], t statistics [t], p-values [Sig.], and their confidence interval [95% C.I.].

Table 5.15: Test of Between-Subject Effects Intent to Help a Stranger (Brazilian Subsample)

Dependent Variable: Intent to Help a Stranger

Source	Type III Sum of Square	df	Mean Square	F	Sig.	Partial Eta Squared (η_p^2)
Corrected Model	92.591[a]	8	11.574	18.678	< 0.001	0.339
Intercept	0.011	1	0.011	0.017	0.895	0.000
SEDVS: Witness	16.187	1	16.187	26.123	< 0.001	0.082
GSE: Total scale	0.320	1	0.320	0.516	0.473	0.002
DVMAS: Total Scale	1.379	1	1.379	2.226	0.137	0.008
PPH: Total scale	5.758	1	5.758	9.293	0.003	0.031
MDMQ: Buck-passing	4.081	1	4.081	6.587	0.011	0.022
Gender	9.641	1	9.641	15.559	< 0.001	0.051
Knowledge/Training about IPV	8.681	1	8.681	14.010	< 0.001	0.046
Gender*Knowledge/Training about IPV	1.704	1	1.704	2.749	0.098	0.009
Error	180.319	291	0.620			
Total	2720.359	300				
Corrected Total	272.910	299				

Note. [a] R Squared = 0.339 (Adjusted R Squared = 0.321). SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale.

Table 5.16: Estimate of Parameters Intent to Help a Stranger (Brazilian Subsample)

Dependent Variable: Intent to Help a Stranger

Parameters	B	Std. Error	t	Sig.	95% C.I. Lower	95% C.I. Upper	Partial Eta Squared η_p^2
Intercept	- 0.005	0.588	- 0.008	0.993	-1.163	1.153	0.000
SEDVS: Witness	0.129	0.025	5.111	< 0.001	0.079	0.179	0.082
GSE: Total scale	0.082	0.114	0.718	0.473	- 0.143	0.307	0.002
DVMAS: Total Scale	- 0.103	0.069	-1.492	0.137	- 0.238	0.033	0.008
PPH: Total scale	0.198	0.065	3.048	0.003	0.070	0.326	0.031
MDMQ: Buck-passing	- 0.042	0.017	-2.566	0.011	- 0.075	- 0.010	0.022
Gender(F)	0.248	0.114	2.175	0.030	0.024	0.472	0.016
Knowledge/Training about IPV(No)	- 0.560	0.144	-3.897	< 0.001	- 0.843	- 0.277	0.050
Gender(F)*Knowledge/Training about IPV(No)	0.341	0.205	1.658	0.098	- 0.064	0.745	0.009

Note. SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale. The table shows the model's coefficients [B], their standard errors [Std. Error], t statistics [t], p-values [Sig.], and their confidence interval [95% C.I.].

Table 5.17: Test of Between-Subject Effects Intent to Help a Stranger (Canadian Subsample)

Dependent Variable: Intent to Help a Stranger

Source	Type III Sum of Square	df	Mean Square	F	Sig.	Partial Eta Squared (η_p^2)
Corrected Model	96.978[a]	8	12.122	20.089	< 0.001	0.318
Intercept	0.667	1	0.667	1.105	0.294	0.003
SEDVS: Witness	5.623	1	5.623	9.319	0.002	0.026
GSE: Total scale	0.635	1	0.635	1.052	0.306	0.003
DVMAS: Total Scale	0.011	1	0.011	0.018	0.894	0.000
PPH: Total scale	29.625	1	29.625	49.096	< 0.001	0.125
MDMQ: Buck-passing	2.208	1	2.208	3.660	0.057	0.011
Gender	6.055	1	6.055	10.034	0.002	0.028
Knowledge/Training about IPV	8.841	1	8.841	14.652	< 0.001	0.041
Gender*Knowledge/Training about IPV	0.417	1	0.417	0.691	0.407	0.002
Error	207.575	344	0.603			
Total	3320.156	353				
Corrected Total	304.553	352				

Note. [a] R Squared = 0.318 (Adjusted R Squared = 0.303). SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale.

Table 5.18: Estimate of Parameters Intent to Help a Stranger (Canadian Subsample)

Dependent Variable: Intent to Help a Stranger

Parameters	B	Std. Error	t	Sig.	95% C.I. Lower	95% C.I. Upper	Partial Eta Squared η_p^2
Intercept	0.561	0.484	1.160	0.247	- 0.390	1.513	0.004
SEDVS: Witness	0.056	0.018	3.053	0.002	0.020	0.092	0.026
GSE: Total scale	- 0.098	0.096	-1.026	0.306	- 0.287	0.090	0.003
DVMAS: Total Scale	- 0.008	0.061	- 0.134	0.894	- 0.127	0.111	0.000
PPH: Total scale	0.510	0.073	7.007	< 0.001	0.367	0.653	0.125
MDMQ: Buck-passing	- 0.029	0.015	-1.913	0.057	- 0.059	- 0.001	0.011
Gender(F)	0.236	0.152	1.551	0.122	- 0.063	0.535	0.007
Knowledge/Training about IPV(No)	- 0.458	0.165	-2.771	0.006	- 0.784	- 0.133	0.022
Gender(F)*Knowledge/Training about IPV(No)	0.160	0.193	0.831	0.407	- 0.219	0.540	0.002

Note. SEDVS = Self-efficacy to Deal with Violence scale; GSE = Generalized Self-Efficacy scale; DVMAS = Domestic Violence Myth Acceptance Scale; MDMQ = Melbourne Decision Making Questionnaire; PPH = Perceptions of Peer Helping scale. The table shows the model's coefficients [B], their standard errors [Std. Error], t statistics [t], p-values [Sig.], and their confidence interval [95% C.I.].
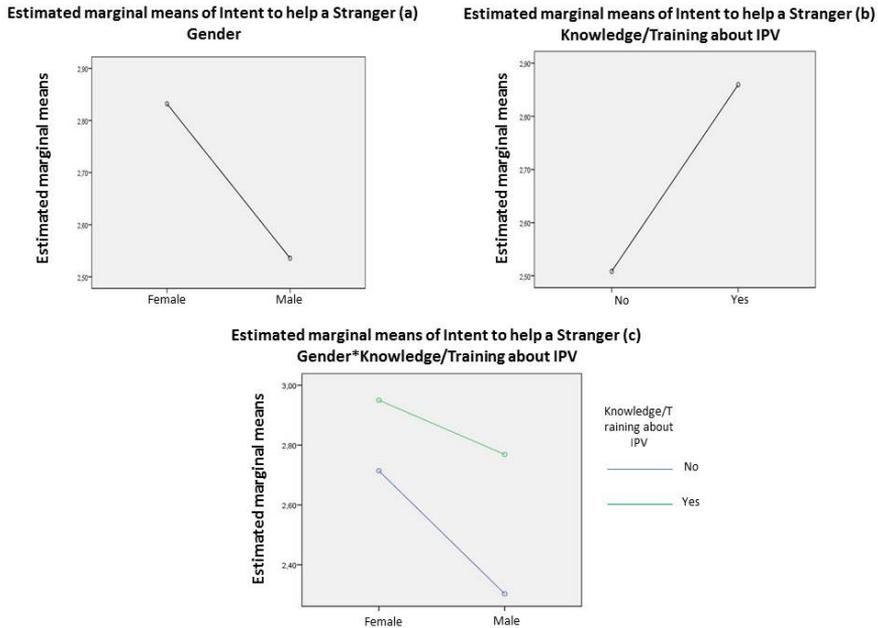
Figure 5.9: (a) Gender differences of estimated marginal means of Intent to Help a Stranger (Main effect). (b) Difference between knowledge/training about IPV of estimated marginal means of Intent to Help a Stranger (Main effect). (c) Interaction effect between gender and knowledge/training about IPV of estimated marginal means of Intent to Help a Stranger.

According to our hypothesis, participants were more willing to help a friend than a stranger. This finding is consistent with past studies that highlighted how a friendship between bystander and victim increases the likelihood of helping maybe because of more sense of responsibility or more perception of safety to intervene within members of own in-group (e.g., [44, 64, 180, 213, 267]).

Univariate results are consistent with all our hypothesis about individual, relationships, community and societal factors. However, an indirect experience of IPV during adulthood, traumatic events about violence during childhood and a sense of community had less strong relationships with the intent to help a friend and a stranger than other variables under investiga-

tion.

In both intent to help a friend and a stranger, the variable that best explains the variance was the perception of peer helping norms. According to our hypothesis, greater perception of prosocial peer helping norms reported more intent to help a friend and stranger. This result is consistent with past studies that demonstrated that perceptions of peer norms supporting coercion in a relationship are associated with a lower bystander intent to help [30, 59]. Moreover, in front of an ambiguous situation, bystanders usually seek social cues and may be influenced by their perception of peer norms [201, 253].

Consistent with our hypotheses, higher self-efficacy, especially as a bystander, and knowledge/training about IPV were influential factors for the intent to help a friend and a stranger. Indeed, previous studies found that bystander with higher self-efficacy [30, 206] and with more awareness of sexual violence and IPV issues [26, 30] are more likely to intervene in IPV circumstances.

With regard to gender factor, our study showed that female participants have more intent to help a friend and a stranger. This result is consistent with some studies which found that females report more levels of bystander behaviors [26, 232]. As suggested by Nicksa [253], it is possible that females more identify themselves with the survivor than males, and the bystander acts explored in the study are not risky.

Concerning the difference between intent to help a friend and a stranger, domestic violence myth acceptance and maladaptive decision-making style seem to affect only the intent to help a friend. It is possible that the influence of personal characteristics, such as attitudes towards domestic violence and decision-making styles, is higher in a situation where people are more inclined to intervene (e.g., help a friend) than situations where people are not usually willing to intervene (e.g., help a stranger).

As second main part of results, societal factors may influence the bystander intent to help. As expected, Italian university students reported less intent to help a friend and a stranger than Canadian and Brazilian counterparts. Moreover, univariate analysis showed that Italian participants also showed some differences compared to Brazilian and Canadian participants such as higher domestic violence myth acceptance, less perception of peer helping norms as prosocial, less knowledge/training about IPV, and less self-efficacy to deal with violence as a bystander.

As suggested by Rosselli [302], although Italian legislation about contrasting violence against women has started to adopt international standards (e.g., Istanbul Convention), this legislation *"does not stem from an open public debate and a shared public approach"* [302, p. 20]. Indeed, many Italian women are not aware of laws about protecting the victim of domestic violence or political measure to prevent this issue [126].

Moreover, Italian, Brazilian, and Canadian university students' intent to help a friend and a stranger was affected by more similar than different factors. For instance, shared influential factors by all three subsamples are: a) the perception of peer helping norms and the self-efficacy to deal with violence as a bystander for intent to help a friend; b) the perception of peer helping norms and the knowledge/training about IPV for intent to help a stranger.

Among different influential factors, Italian participants' intent to help a stranger was affected by generalized self-efficacy while Brazilian and Canadian counterparts by self-efficacy to deal with violence as a bystander. Moreover, there were no gender differences in the intent to help a friend and a stranger for Italian subsample whilst gender difference were found Brazilian participants' intent to help a stranger and Canadian participants' intent to help a friend.

This study presents some limitations that should be mentioned. Despite the large sample recruited from three different countries, participants are university students so it will be important for future research to investigate bystander intent to help a friend and a stranger involved in sexual assault or/and IPV in other population targets in order to have a broader knowledge of the factors likely to influence this intention. However, the decision to have a group within a young target is justified by their high rate of IPV (e.g., [341]), and having more knowledge about how to prevent IPV among university students might help to reduce this issue in more adult intimate relationships.

Our data are self-report about the intent to help a friend and a stranger and it was not a behavioral measure. Although our results have shown a greater intention to help a friend and a stranger in those who have already had indirect experiences of IPV, however, this entity was really small (i.e., eta-squared). In addition, this study also investigated the impact of variables such as attitudes towards the IPV, the perception of prosocial peer helping norms and self-efficacy (both general and specific in addressing the violence)

which according to the Theory of Planned Behavior [7] these variables, together with intentions, are considered the most important antecedents of the behavior.

Finally, some of the measures including in this study such as help-seeking behavior as a victim or perpetrator (SEDVS - factor 2) and the shared influence subscale (MTSOCS) showed low internal consistency coefficients (Cronbach's alpha of 0.55 and 0.44 respectively). However, these measures also had low reliability in other previous research (e.g., [285, 357]), and besides, the results obtained with these subscales are not the main contributions of this study. Further research should replicate this investigation adding other measures for shared influence and self-efficacy of help-seeking behavior as a victim or perpetrator.

To conclude, this cross-cultural study suggested that for increasing the intent to help a friend and a stranger in situations of sexual assaults or IPV it is important not only implement social policies contrasting IPV and violence against women but it also necessary that these policies reach and share themselves with a wider community.

Given the high rates of violence recorded by past studies among university students (e.g., [341]), bystander prevention programs should continue to be addressed to this target, especially Italian university students that report a less willingness to help a friend and a stranger during sexual violence and IPV situations.

Moreover, bystander approach with university students should really struggle to make them aware of the influence of the perception of peer helping norms on the bystander intent to help a friend and a stranger.

Finally, our results also revealed that relational distance with people involve in IPV and sexual violence situations impacted the intent to help, showing a less willingness to help a stranger than a friend. Thus, as suggested by Bennett and Banyard [44], bystander prevention programs should give knowledge and skills about how to deal with violence suffered or perpetrated by someone that an individual knows or does not know, highlighting common and specific challenges.

Chapter 6

Intimate Partner Violence: An Application of Agent-Based Modeling

In this chapter, two stochastic agent-based models are presented as an alternative approach to understand IPV dynamics. Based on the theory of the Cycle of Violence, both models have four discrete states: passivity, normal situation, upset and physical assault.

The first model represents the short-time behavior of a couple, starting from an upsetting episode and ending in an absorbing state that can be either the "normal state", or a state dominated by a predominant violence such as "male violence", "female violence", or "mutual violence/separation".

The second model simulates the couple dynamics over a longer time span. After defining the transition probabilities, we first analyze the evolution of the couple in isolation and then we consider the case in which the individuals modify their behavior depending on the perceived violence from other couples in their environment or based on the support received by the informal social networks. Simulation results of the phase diagrams show the emergence of characteristic patterns of IPV dynamics, giving important prac-

tical implications for IPV prevention intervention. [1][2]

6.1   Introduction

Agent-based modeling (ABM) is a method which allows researchers to simulate social systems through interactions among agents who act in accordance with simple probabilistic rules [251]. Different disciplines such as economics, social science, and biology have used the ABM [156] which should have more application in social psychology field [18, 19, 141, 204, 329, 365]. Indeed, the features of ABM such as micro and macro levels attention, non-linear effects, and multiple causal directions, allow researchers a better description and understanding of emergent behavior coming from social interactive processes than prevalent approaches of social psychology [329].

In a couple, the behavior of a partner can be influenced not only by the behavior of the other but also by the context surrounding them. For this reason, some researchers have identified a couple as a dynamic system [74, 176], in which violent behaviors may arise. Indeed, intimate relationships can be characterized by the presence of various forms of violence which together are defined as intimate partner violence (IPV) [55].

Furthermore, these aggressive, abusive, controlling acts might be maintained or mitigated by different community members such as family members and friends, given that a couple is not isolated but located in an environment (e.g., neighbors) [137, 227].

Recently, a study attempted to explore the help-seeking behaviors of IPV victims by means of the ABM approach [109]. Presumably, this is the second study that tries to understand IPV dynamics using this method. Drigo and colleagues [109] highlighted that the ABM approach is a suitable method for IPV dynamics and it furnishes implications for its policies.

As suggested by Neal and Lawlor [251], ABM is extremely useful in analyzing processes that may be impossible or unethical to be investigated by empirical data, such as the factors that affect IPV. For example, it is unethical asking a victim of IPV to remain in an abusive relationship in order to

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[1]Part of this chapter has been submitted as Guidi, Elisa; Meringolo, Patrizia; Guazzini, Andrea; Bagnoli, Franco. "Stochastic Agent-Based Models of Intimate Partner Violence" in *Journal of Artificial Societies and Social Simulation*; and available as a preprint in *arXiv:1611.06544*.

[2]The data and the programming codes developed with MATLAB are available upon request by writing to elisa.guidi@unifi.it or franco.bagnoli@unifi.it

assess the possible reactions of the abuser, as well as asking a family member of a victim of IPV to stop providing support in order to evaluate the consequences on the violent relationship. Moreover, it is extremely difficult to involve victims and abusers (and even bystanders) of IPV as participants in psycho-social studies.

IPV is a complex and multi-dimensional problem affected by a wide range of risk factors [3, 10, 195]. By means of the ABM, in this study it has been possible to choose some parameters which influence the likelihood of experiencing IPV such as the level aggressiveness toward the partners (a) and the level of perceived informal social support (s), modifying them and simulating the possible consequences of their effect on the dynamics of IPV.

According to the suggestion by Drigo and colleagues [109], we chose to use stochastic agent-based models because stochasticity could simulate not only the unpredictability of human beings but also the features of IPV context.

We developed two stochastic agent-based models in MATLAB which allows building agent models by means of scripting language written by researchers [224]. The first model denoted "short-time evolution" assessed how individuals' tendency to be aggressive and hostile towards the partners (i.e., individual parameter), and the perception of violence in their social network (i.e., contextual parameter) may give rise to the IPV (i.e., macroscopic social phenomenon).

The second model labeled "long time-span behavior" is an adaptation of the first model in which it was investigated the effect of informal social support (i.e., contextual parameter) on the long-term dynamics of a couple at risk of IPV.

6.2   Aim of the Research

Following the suggestion by Smith and Conrey [329], we approach the dynamics of IPV by means of an agent-based model, in which the components of a couple can assume a finite number of states and each individual updates his/her state at discrete time steps in a probabilistic way, according to personal parameters, and based on the present state of the participants in the couple as happens also in game-theoretical approaches (e.g., [16, 241]).

Here we explore the phase space of these models, i.e., all possible alternatives. This is possible because we restricted the number of parameters. Alternative or complementary approaches could be based on evolutionary

dynamics, i.e., the selection of "better adapted" individuals or social norms (e.g., [174, 181]).

The choice of discrete time units is motivated by the fact that previous research, using qualitative methods (e.g., interviews) and/or quantitative methods (e.g., self-report questionnaires), assessed dynamical patterns of IPV on time units of the order of days or weeks, even if the actual violence or verbal offense episodes may occur in a predictable, moderately predictable, or unpredictable manner for the victim (e.g., [63, 177]). Therefore the probability transition has to be interpreted as the probability that in a given unit time (day or week) one or more episodes were reported.

We first define the transition probabilities and analyze the evolution of the couple in isolation. Since, as already said, the occasional presence of IPV seems to be influenced by the same factors for women and men [229], we use a symmetric model for the two genders. More specifically, the model is defined by the transition probabilities among the same states for the two genders. These transition probabilities depend on a parameter (e.g., the aggressiveness or the external informal social support) which is in real contexts quite different for males and females. We explored all possibilities.

Secondly, we assume that the personal predisposition also evolves on the basis of messages coming from the environment, assumed to be composed of similar couples (i.e., using a mean-field approximation). A justification of this approach is that couples tend to modify their network of contacts establishing links with other couples exhibiting similar behaviors such as women in violent relationship [178].

6.3   Model 1: Short-Time Evolution after an Upsetting Episode

Our first model aims at representing the short-time behavior of a couple, starting from an upsetting episode and ending in an absorbing state like "normal state", predominant violence such as "male violence", "female violence", or "mutual violence/separation". Here we use the term "predominant" to indicate a situation in which the violence is mainly perpetrated by a single partner, while we use the term "mutual" when the violence is perpetuated by both members of the couple. Given that mutual violence may cause more injuries than non-reciprocal violence [374] and following past studies about help-seeking behavior in the case of IPV [12, 108], we supposed that
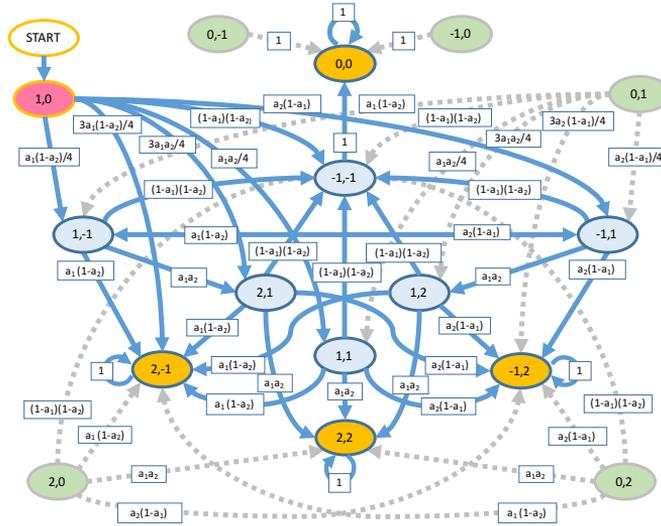
Figure 6.1: The Transition Diagram of Couple Dynamics for Model 1. The ovals represent the 16 possible states (s_1, s_2) of the couple and the arrows the transitions $M(s'_1, s_2 | s_1, s_2; a_1, a_2) = \tau(s'1 | s_1, s_2; a_1)\tau(s'_2 | s_2, s_1; a_2)$. The initial state is colored in red and marked by the START label. The green ovals are unreachable "garden of Eden" states, which can only be the starting states of the dynamics, and the corresponding transition probabilities are dashed. The four absorbing states normal $(0, 0)$, separation $(2, 2)$, male violence $(2, -1)$, female violence $(-1, 2)$ are marked in yellow.

the victim experience mutual violence recognized the situation as severe and they will seek help and leave the relationship (e.g., separation).

6.3.1   Model Description

We model the couple as composed by a man (opponent 1) and a woman (opponent 2), distinguished only by the fact that the evolution of the couple starts with the first one upset and the second one in a normal state. Each individual $i = 1, 2$ can assume four discrete states s_i^t at time t, with $s_i \in \{-1, 0, 1, 2\}$. We define these states following the Cycle of Violence Theory [368] as follows. The state $s_i = 0$ corresponds to the normal situation, while $s_i = -1$ corresponds to passivity, representing a situation of dependence and

acceptance, but we also use this label to represent the "beg for pardon" state after an aggression. The label $s_i = 1$ represents a tension condition where the member of the couple is upset, and finally $s_i = 2$ corresponds to the presence of episodes of violence or physical assault.

The model proceeds by discrete time steps. In each time step, the two individuals forming the couple face the other member and change his/her state (from s_1 and s_2 to s'_1 and s'_2) with a probability $\tau(s'_i|s_i, s_j; a)$, where i represent the individual being updated and j the partner and the parameter a is described below.

Clearly, given a certain situation, the sum of all possible transition probabilities is one, i.e.,

$$\sum_{s'_i=-1}^{2} \tau(s'_i|s_i, s_j; a) = 1,$$

for each s_i and s_j.

The transition matrix τ depends on a parameter a (aggressiveness or assertiveness) that in our approximation represents, in a schematic manner, both the predisposition toward an aggressive behavior, namely the tendency to attack the partner, and the active and assertive capacity of responding to the demands of partners, including also the ability to leave the relationship. We use the same form of the transition matrix for both the male and the female members, possibly computed with different values of a.

We divided the state of a couple as a (tensor) product of individual states for two reasons. First of all, because in this way the model is more apt of being validated using personal profiles and secondly because for a couple there are 16 possible states (all combinations of the four individual states), which gives a transition matrix (from old to new states) with $16 \times 16 = 256$ entries. At the individual level, the transition probability $\tau(s'_i|s_i, s_j; a)$ has only $4^3 = 64$ entries, most of which are set to zero, as reported in the Appendix A in Tables A.1–A.4.

The basic idea is the following: for a low level of the aggressiveness factor a, the individual tends to return to the normal state 0 or to enter the passive state -1 after an aggression. For a high level of a the individual tends to respond to an aggression becoming upset or responding with violence to violence which may eventually lead to the separation of the couple.

The transition probabilities of the couple, from (s_1, s_2) to (s'_1, s'_2) with

individual parameters a_1 and a_2 is given by

$$M(s'_1, s'_2|s_1, s_2; a_1, a_2) = \tau(s'_1|s_1, s_2; a_1)\tau(s'_2|s_2, s_1; a_2),$$

where we assumed that each individual updates his/her state independently and therefore the couple transition probability becomes a product of individual terms. This choice has also the advantage of keeping the number of possible transitions limited, and more easily confronted with experimental data.

From now on we neglect to indicate the dependence of τ from the parameters a. We can visualize the non-zero transition probabilities as a graph, as reported in Fig. 6.1. With the choice of transition probabilities illustrated in Fig. 6.1, the model presents four possible absorbing states, i.e: $(0, 0)$, normal state of the couple, $(2, -1)$ and $(-1, 2)$ which correspond to a situation in which one partner is violent and the other passive (prevarication), and $(2, 2)$ in which both partners are violent and which is generally the prelude for the breaking of the couple.

A time step is composed of two elementary processes that occur in parallel, for the two members of the couple. Each step is given by

$$s'_i = \begin{cases} -1 & \text{with probability } \tau(-1|s_i, s_j), \\ 0 & \text{with probability } \tau(0|s_i, s_j), \\ 1 & \text{with probability } \tau(1|s_i, s_j), \\ 2 & \text{otherwise.} \end{cases} \tag{6.1}$$

We started all simulations from a situation in which one partner (the male) is upset ($s_i^0 = 1$) and the other is calm ($s_j^0 = 0$). An actual "history" is given by a sequence of states, i.e., a stochastic trajectory generated by a particular choice of the possible transitions.

An example of a trajectory, for a high values of a_1 and an intermediate value of a_2 is reported in Figure 6.2. This trajectory can be read in this way: the male experiences a small inconvenient and becomes upset, while the female is calm ($t = 0$). The male, due to his high aggressiveness a_1 maintains his state, while the female tries to calm him assuming a passive state ($t = 1$). Instead of calming the partner, this passivity leads the male to assume a violent behavior. In the meanwhile (the dynamics are parallel) the female, due to her intermediate value of a_2 (assertiveness in this case) becomes upset ($t = 2$). However, confronted with violence and having an
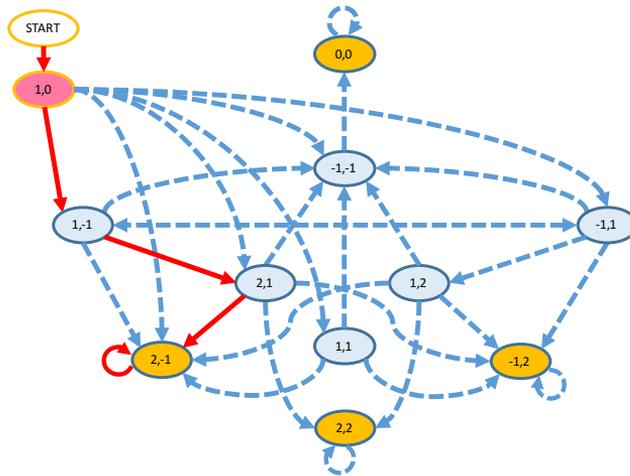
```
a1=0.8, a2=0.3    % individual parameters
t=0, s1=1 s2= 0   % initial state: upset male and normal female
t=1, s1=1 s2=-1   % upset male and compliant female
t=2, s1=2 s2= 1   % violent male and upset female
t=3, s1=2 s2=-1   % absorbing state: violent male and passive female
t=4, s1=2 s2=-1
t=5, s1=2 s2=-1
```

Figure 6.2: An Example of a Stochastic Trajectory (i.e., red-continuous arrows).
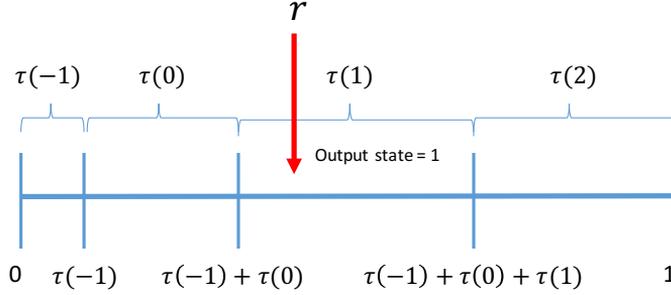
Figure 6.3:   The Random Choice of a New State.

intermediate value of aggressiveness/assertiveness a_2 the female comes back to the passive state $s_2 = -1$, while the male persists in his violent behavior $s_1 = 2$ ($t = 3$). This configuration constitutes and absorbing state for the model. In this case, the final state can be defined as male prevarication.

The choice of the new state, for example s'_1, was given by a random number r between zero and one, that was confronted in sequence with the probability of the four possible outcomes:

$$\begin{cases} s'_1 = -1 & \text{if } r < \tau(-1|s_1, s_2), \\ s'_1 = 0 & \text{if } \tau(-1|s_1, s_2) \le r < \tau(-1|s_1, s_2) + \tau(0|s_1, s_2), \\ s'_1 = 1 & \text{if } \tau(-1|s_1, s_2) + \tau(0|s_1, s_2) \le r < \tau(-1|s_1, s_2) + \tau(0|s_1, s_2) + \tau(1|s_1, s_2), \\ s'_1 = 2 & \text{otherwise, i.e., if } r \ge \tau(-1|s_1, s_2) + \tau(0|s_1, s_2) + \tau(1|s_1, s_2). \end{cases}$$

$$(6.2)$$

Notice that the order of the confrontation is irrelevant. This algorithm is illustrated in Fig. 6.3.

Clearly, the repetition of the simulation with the same parameters can lead to a different evolution, since the dynamics are stochastic. Hence, we should average over various realizations. It is, however, possible to obtain the evolution equation for the probability distribution for the couple (Markov chain).

Let us denote by $P(s_1, s_2; t)$, the probability of finding the couple in states (s_1, s_2) at time t. $P(s_1, s_2; t)$ has 16 components, linked by the normalization

condition

$$\sum_{s_1=-1}^{2} \sum_{s_2=-1}^{2} P(s_1, s_2; t) = 1.$$

The temporal evolution of P is given by the Markov equation

$$P(s_1', s_2'; t+1) = \sum_{s_1} \tau_1(s_1'|s_1, s_2; a_1)\tau_1(s_2'|s_2, s_2; a_2)P(s_1, s_2; t). \qquad (6.3)$$

In the following numerical experiments we used this Markovian approach, thus obtaining the asymptotic probability distribution instead of averaging over many realizations, iterating Eq. (6.3) for a sufficient number of time steps.

6.3.2   Simulation Results

We repeated the simulation for all possible male and female aggressiveness, a_1 and a_2, we can obtain the phase diagram of the system, as reported in Fig. 6.4. In the Figure we report the probability of falling into an absorbing state (basin of attraction) starting with male upset ($P(1, 0; 0) = 1$) for any value of the two aggressiveness parameters a_1 and a_2, letting the system evolve for a number of time steps T = 20, sufficient to reach an absorbing state. In particular we show the asymptotic probability $P(0, 0)$ (normal behaviors), $P(2, 2)$ (mutual violence, leading to separation), $P(2, -1)$ (male violence), $P(-1, 2)$ (female violence).

The results are not unexpected. For low values of both male and female aggressiveness, the only asymptotic state is the "quiescent" one $(0, 0)$. Similarly, for high values of both aggressiveness the only possible absorbing state is the mutual violence, preceding the separation of the couple $(2, 2)$, while with for two different values of the aggressiveness the final state is that of dominance (i.e., male violence or female violence).

6.4   Model 1 Self-Consistent Phase Diagram

Let us now explore the consequences of a social influence on the aggressiveness.
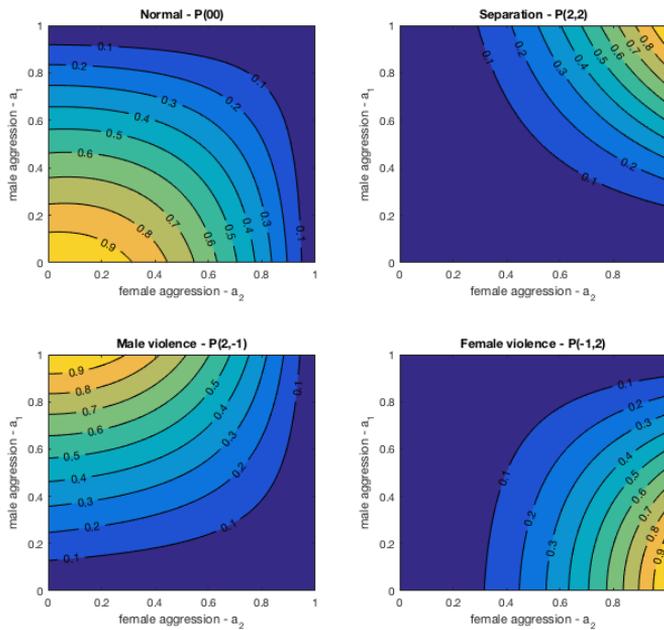
Figure 6.4: Probability of falling into one of the four absorbing states of Model 1 for all possible values of male (a_1) and female (a_2) aggressiveness. The absorbing states are the asymptotic states of the probability distribution $P(s_1, s_2)$ corresponding to: normal $P(0,0)$, separation $P(2,2)$, male violence $P(2,-1)$, female violence $P(-1,2)$. The asymmetry between male and female is only due to the initial state $P(1,0;0) = 1$.
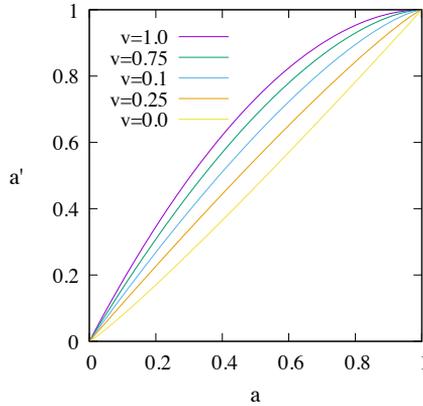
Figure 6.5: The Evolution Function of Aggressiveness $a' = f(a; v, v_c)$ for different levels of Perceived Violence v, with $v_c = 0.1$.
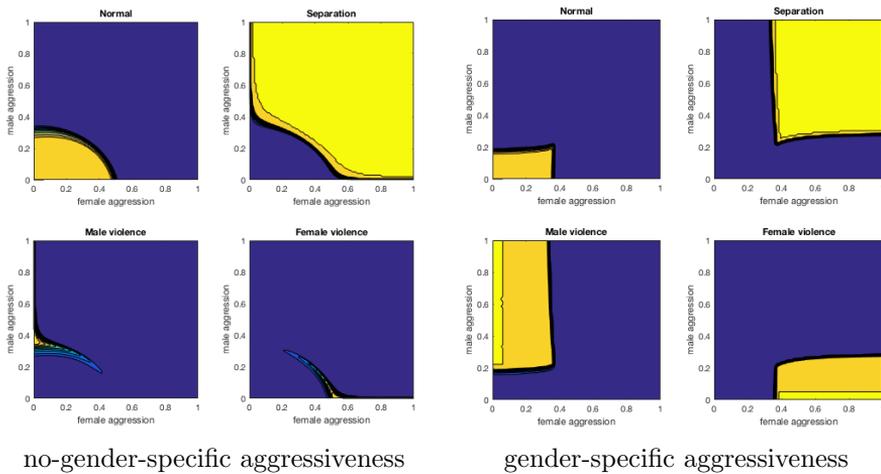
Figure 6.6: Absorbing States of Model 1 with a Mean-Field (self-consistent) Evolution of the Aggressiveness with $v_c = 0.1$. Axes, plots, color code as in Fig. 6.4. Averages over 20 runs (M).

6.4.1   Model Description

We assume that a society is composed of a certain number of similar couples, all following the same dynamics. In other words, it is as if the couple was surrounded by "mirrors" reflecting their dynamics and influencing their own aggressiveness, i.e., a mean-field or self-consistent approach.

This effect is similar to that of assuming that a couple modifies their behavior according to their past history, but the interpretation that we want to suggest is that the actual aggressiveness of a member of the couple depends on that perceived in his/her environment, exploring the consequences of a "social" evolution of the conflicts.

We measure the perceived violence as the average number of violent states (2) assumed by one of the members of the couple after a certain number of time steps. In other words, we fix the parameters a_1 and a_2 and the initial state of the couple $P(1, 0; 0) = 1$, let the system evolve for a number of time steps $T = 20$ (generally sufficient to let the couple reach an absorbing state), after which we measure the gender violence v_1 and v_2 as

$$v_1 = P(2, -1; T) + P(2, 2; T),$$
$$v_2 = P(-1, 2; T) + P(2, 2; T).$$

We then let both aggressiveness evolve depending on a threshold v_c: if the perceived violence is greater than the threshold the aggressiveness increases, the reverse in the opposite case

$$a' = f(a; v, v_c) = \begin{cases} 1 - (1-a)^{1+v-v_c} & \text{if } v > v_c, \\ a^{v_c - v + 1} & \text{otherwise.} \end{cases} \qquad (6.4)$$

The plot of the function $f(a; v, v_c)$ is reported in Fig. 6.5 for $v_c = 0.1$, value used in the simulations. The function is designed to provide a slow polarization of the aggressiveness (in both senses) according with the perceived violence in the environment.

6.4.2   Simulation Results

The process is repeated $M = 20$ times (runs). We studied two cases: one in which the perceived violence is not discriminated by gender, so that the value of the external perceived violence v used in Eq. (6.4) is simply the average of the two sexes $v = (v_1 + v_2)/2$, and one in which the aggressiveness

of each member of the couple evolves feeling only the appropriate gender violence.

The results of simulations are reported in Figs. 6.6. One can see that the situation is now much more extreme than in the simple case of Fig. 6.4, since the coexistence of two phases is limited to the boundaries of the orange zones in Figs. 6.6. Given an initial aggressiveness a_1 and a_2, the system almost always converges to a unique absorbing state.

Another interesting aspect is the almost disappearance of the male and female prevarication if the perceived violence is "asexual", while the corresponding phases are much larger if the perceived violence only comes from the appropriate gender. This behavior is sensible, albeit deviant: if male aggressiveness is only supported by male violence, and similarly for females, "cliques" of similar behavior can arise in the society.

6.5 Model 2: Long Time-Span Behavior of a Typical Couple

The second model aims at representing the couple dynamics over a longer time span so that for instance couples that reach the "separation point" of mutual violence are replaced with new couples initially in the calm state. This procedure simulates the evolution of a population formed (in average) by the same number of couples. The population varies in time because some couples separates (exiting the pool under investigation) and new couples form. Assuming that the population is stable, in average for any separation there is a formation of a new couple.

This model is specifically aimed at studying the effect of informal social support on the long-term dynamics. Synthetically, social support can be defined as the help given and received from others at critical times of own life [270]. We focused on informal (or non-professional) social support coming from family, friends, colleagues, relatives and acquaintances of a victim and an aggressor of IPV, given that IPV victims are more likely to disclose their abuse to a member of informal social support [344]. A recent review [344] indicated that some types of helpful informal social supports for victims of IPV consist of emotional support (e.g., trusting the victim's experiences) and practical support (e.g., providing a place to stay) while unhelpful informal social supports take attitudes and behaviors such as pressuring the victim to leave the relationship, blaming the victim, expressing anger toward the
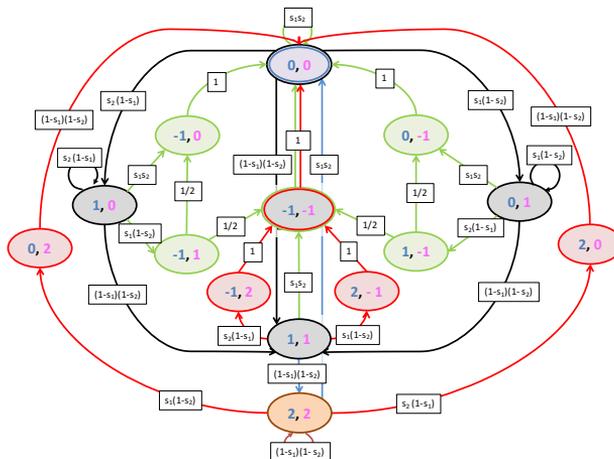
Figure 6.7: The Transition Matrix for Model 2.

abuser, disbelieving or minimizing the violence, or avoiding the victim.

6.5.1   Model Description

For this second model, we used as parameter the informal social support received by the society (i.e., family, friends, colleagues, relatives and acquaintances of a victim and an abuser of IPV), in the sense of reinforcement of assertiveness (i.e., result of helpful informal social supports) but also of aggressiveness (i.e., outcome of unhelpful informal social supports). We modified the individual transition probabilities as shown in Tables A.5–A.8, reported in the Appendix A. Given that anger seems to be associated with less helpful behaviors [83, 84], we suppose that informal social support parameter s is the opposite of parameter a.

The resulting transition graph for the evolution of the couple is shown in Fig. 6.7. In this case, we do not have any absorbing state, i.e., the asymptotic probability distribution is not concentrated on some nodes. However, thinking to the trajectories of the couples, we are interested on these paths characterized by different behaviors, as illustrated in the Fig. 6.7.

We marked in red the paths that may lead to episodes of violence, in green those corresponding to normal behavior with occasional upsetting episodes,
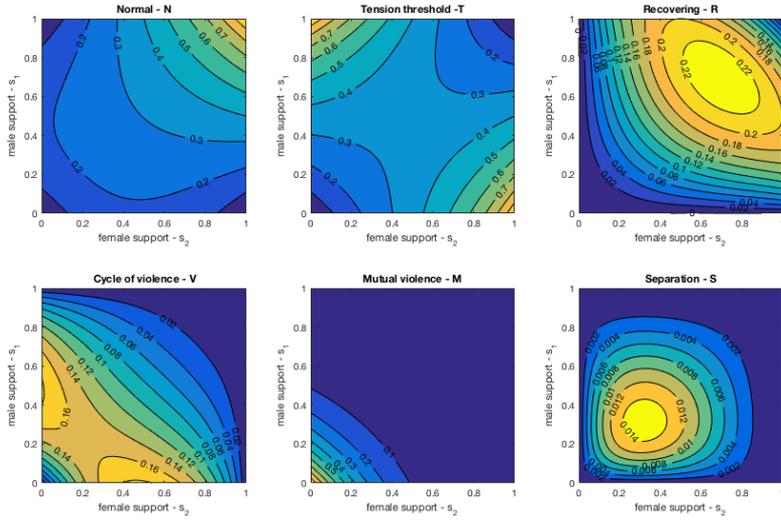
Figure 6.8: Probability of observing the (from left to right and top to bottom) normal behaviour $\mathcal{N}$, tension threshold $\mathcal{T}$, recovering path $\mathcal{R}$, cycle of violence $\mathcal{V}$, mutual violence $\mathcal{M}$ and separation $\mathcal{S}$ for a generic couple for Model 2. Color code as in Fig. 6.4.
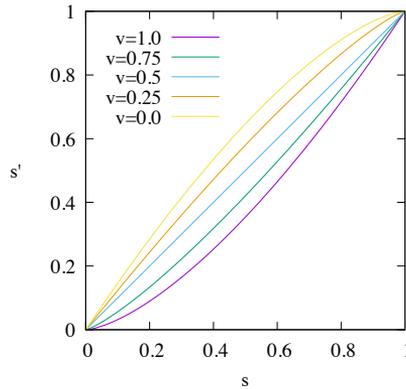
Figure 6.9: The Evolution of Informal Social Support for Model 2 $s' = g(s; v, v_c)$ for different levels of Perceived Violence v and $v_c = 0.1$.

and in gray the states belonging to both. Notice that we have two "garden of Eden" states, namely $(2,1)$ and $(1,2)$ that cannot be reached by dynamics and have been eliminated.

We tried to measure the importance of the different paths from the asymptotic distribution, after a transient of $T = 20$ steps (sufficient to reach an asymptotic state), starting from the "male upset" episode $P(1,0;0) = 1$. In other words, we tried to measure how often a given behavior appears in the dynamics of a population.

With "normality" we still refer to the asymptotic weight of state $\mathcal{N} = P(0,0)$.

We then measured the "threshold" $\mathcal{T}$ condition (grey states in Fig. 6.7) as the weight of states $(1,0)$, $(0,1)$ plus the flux from state $(1,1)$ to $(0,0)$ though state $(2,2)$, i.e.

$$\mathcal{T} = P(0,1) + P(1,0) + P(1,1).$$

The "recovering" path $\mathcal{R}$ is marked in green in Fig. 6.7 and computed as

$$\mathcal{R} = P(-1,0) + P(0,-1) + P(-1,1) + P(1,-1) + \\ P(-1,-1) - [P(-1,2) + P(2,-1)].$$

The "violence" cycle $\mathcal{V}$, in red in Fig. 6.7, is defined as

$$\mathcal{V} = P(-1,2) + P(2,-1) + P(0,2) + P(2,0).$$

We also measured the "mutual violence" component $\mathcal{M}$ as

$$\mathcal{M} = P(2,2)(1 - s1)(1 - s2),$$

and finally the "separation" rate $\mathcal{S}$ as

$$\mathcal{S} = P(2,2)s_1 s_2$$

6.5.2   Simulation Results

The resulting phase diagram of the evolution of all possible informal social supports received by males and females are reported in Fig. 6.8. As expected, the normal state corresponds to high support, while the tension state (the border between normal and violence) corresponds to high support for a gender and low support for the other.
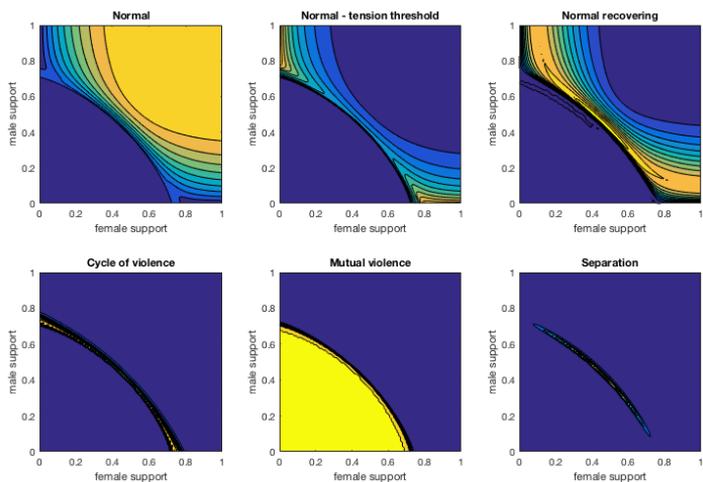
Figure 6.10: Phase Diagram of Model 2 with a Mean-Field (self-consistent) Evolution of the Aggressiveness with $v_c = 0.1$ and Perceived Violence Not Separated per Gender. Axes, plots and color code as in Fig. 6.8. Averages over 20 runs.

Similarly, mutual violence occurs for low support for both sexes. The cycle of violence extends near the mutual violence zone, with asymmetric support while the recovering path is near the normal state, with relatively high support for both genders.

The separation (flux from violence to normal state) is somewhat complementary to the cycle of violence and occurs for moderate support (hence the violence). The separation occurs when the two partners have similar support factor, i.e., it is located near the diagonal of the phase diagram, while for the cycle of violence is favored by asymmetric factors.

6.6   Model 2 Self-Consistent Phase Diagram

We apply here the same self-consistent approach as for Model 1, to our second model.
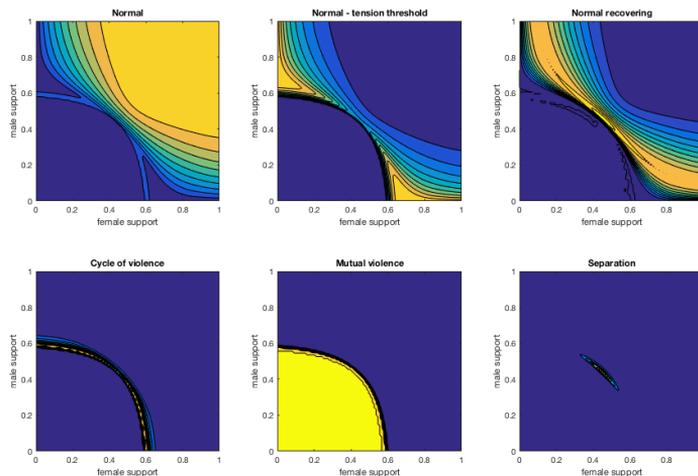
Figure 6.11: Phase diagram of Model 2 with a Mean-Field (self-consistent) Evolution of the Aggressiveness with $v_c = 0.1$ and Gender Perceived Violence. Axes, plots and color code as in Fig. 6.8. Averages over 20 runs.

6.6.1 Model Description

Given that presence of IPV in the informal social support network members may increase the acceptance of violence and decrease the possibility to receive support from them [287, 288], we assume that the informal social support s evolves as a function of the perceived violence (see Fig. 6.9) as

$$s' = g(s; v, v_c) = \begin{cases} s^{v - v_c + 1} & \text{if } v > v_c, \\ 1 - (1 - s)^{1 + v_c - v} & \text{otherwise.} \end{cases} \tag{6.5}$$

6.6.2 Simulation Results

As in the previous case, the self-consistent behavior is more polarized, even in the absence of absorbing states. The dominant states are now the mutual violence and the normal state, while the cycle of violence, and the separation phases are reduced.

As shown in Figs 6.10 and 6.11, it is evident that now the role of gender in the perceived violence (and thus in the evolution of the informal social support) is marginal compared to the results of Figs. 6.6.

6.7   Discussion and Conclusions of Agent-Based Models

In this paper, we described two stochastic agent-based models with the goal of investigating the dynamics of intimate partner violence in a couple.

We first examined how the individual tendency to be aggressive and hostile towards the partner (i.e., the individual parameter), and the individual perception of violence in his/her social network (i.e., the contextual parameter) may give rise to intimate partner violence (i.e., emerging macroscopic social issue).

Secondly, this "short-time evolution" model has been adapted to investigate the effect of an informal social support (i.e., a contextual parameter), developing a "long-time span behavior" model.

Our first model foresaw the emergence of different absorbing states (e.g., "normal state", "male violence", "female violence", or "mutual violence/separation") depending on the initial parameters (i.e., level of the aggressiveness factor a). Consistent with studies that highlighted how anger and hostility may increase the likelihood of perpetrating IPV [256, 321], simulation results of the first model showed that high level of aggressiveness (a) in one member of the couple leads to a dominance pattern (e.g., "male violence", "female violence") in which that individual is more likely to perpetrate violence than the other. Moreover, high level of aggressiveness in both sexes leads to a reciprocal violence pattern (e.g., "mutual violence/separation").

Extending the first model by means of a polarization of the individual parameter (a) based on social influence of perceived violence in their context (v), simulation results showed an extremely clear distinction of couple behaviors. Interestingly, the male or female prevarication almost vanish if the perceived violence is "asexual", while the corresponding phases are much larger if the perceived violence only comes from the appropriate gender. A possible explanation of these results comes from social psychology which suggests that individuals follow social norms which define shared expectations about acceptable behavior in a society, proving individual behavior is regulated by social regulatory processes [212, 319, 335].

The second model does not present absorbing states, and therefore the trajectory moves over the available states. It is possible to identify typical patterns or cycles that are visited in a random way but with different probabilities. This is also consistent with past research which rated different

patterns of IPV dynamics that may modify over the time [177, 179]

Simulation results of this model showed that for a high symmetrical social support the couple has a higher likelihood to behave in a normal way with occasional conflicts that are resolved. In contrast with a low or an asymmetric social support, violent patterns, both in reciprocal and male or female violence, emerge more likely. As suggested by a recent review [75], the presence of social support may have a protective role for victimization and perpetration of IPV. Interestingly, after the occurrence of violence in the couple, if both members of the couple perceive a high social support, then the couple will have a recovering, while if they perceive a medium social support then the couple will leave. These results seem to support the hypothesis of Katerndahl and colleagues [178] that social support may decrease the chances to be a victim of IPV but it may also allow a victim of IPV to stay in the abuse relationship by reducing the IPV consequences (i.e., in this study the recovering condition).

When we assumed that the informal social support s evolves as a function of the perceived violence, simulation results indicated more polarized behaviors as the first model. However, contrary to the first model, the gender differences faded-out. These results emphasize that social support has a crucial role in preventing IPV, regardless of the sex of those who provide support to the woman or the man.

Despite the simplicity of agent-based models [251], the two models presented here can provide some implications for policy in the field of IPV. Following the recommendations of the "Council of Europe Convention on preventing and combating violence against women and domestic violence" (Istanbul Convention) [259], awareness-raising initiatives about IPV among the general public are crucial preventive actions in this field. Indeed, the simulation results of the first model point out that the presence of IPV would have an impact not only on the individual and relational levels but if IPV is perceived within a community it might have consequences at the macro-social level, becoming a social norm of behavior within an intimate relationship that it can have a gender-specific transmission (i.e., male violence in society increases more male to female violence that female to male violence and vice versa). Moreover, these findings also have practical implications. As suggested by Banyard [28], prevention interventions that based on giving community members a positive role in reducing IPV, such as bystander approach, should make individuals aware of being carriers of social

norms related to IPV and they may modify them with their own behaviors in order to reduce violence in a society.

In addition, the simulation results of our second model suggest that having an informal social support may reduce the likelihood of experiencing IPV. These findings imply that decision makers and professional services that are direct or indirect involved in preventing IPV should take into account the informal social support network members in order to increase their skills to recognize, provide support and deal with IPV. Given that some past studies showed that females are more likely to provide social support in IPV situations [26, 40], our results point out how it is important to also engage more males in giving social support towards individuals involved in IPV to increase an active role of men in preventing this issue [259].

Future research should investigate the critical role of receiving social support after an episode of IPV given that it could increase the likelihood to remain in an abusive relationship. However, our study makes more evidence for the positive and protective role of social support within IPV dynamics.

Although in the literature there are few studies that have tried to investigate the dynamics of IPV through ABM, the models implemented in this study are a starting point for understanding the effect of social influence and informal social support on the dynamics of violence.

Chapter 7

Conclusions

Modeling the dynamics of intimate partner violence (IPV) is a challenge for researchers because of its complex and multi-dimensional nature [195]. For many years, research on IPV has proposed theories characterized by different approaches that have attempted to explain this significant and preventable issue [10]. Recently some authors have highlighted a parallelism among three models present in literature on the dynamics of IPV and three patterns of dynamic systems, suggesting that there is not a unique pattern that can describe all the abusive relationships but different patterns can be developed based on the characteristics of these relationships [63, 176, 177, 179].

Studies of IPV have mainly used quantitative, qualitative or mixed methods. From an extensive review of the literature, it seems that only one study [109] attempted to simulate through agent-based modeling (ABM) the help-seeking behavior of female victims of IPV within a social support system. Thus, the main purpose of this study was to modeling the dynamics of IPV through the application of stochastic agent-based models, comparing simulation results with empirical data.

In this final chapter, we will refer to the main studies aimed to understand the complex dynamics that characterize the IPV (Chapters 4, 5, and 6).

The studies presented in Chapter 3, being preliminary to the implementation of the empirical studies of Chapters 4 and 5, have emphasized their importance in the understanding of some social and group processes operating within online environments and they have already been widely discussed in the third chapter (see section 3.5).

More specifically, we will summarize the results of empirical and ABM

studies about IPV dynamics (7.1) as well as the limitations of them (7.2). Finally, we also report the implications of our results for research and practice (7.3) and possible development for future research (7.4).

7.1   Summary of Contribution

Literature review about IPV highlighted that violence within couples is not only an interpersonal affair but it may take place in front of a third person, defined as bystander [151, 202, 279]. Given the high rates of IPV observed in college students [341], it is very likely that they are witnesses of violence or know someone who experiences IPV. Moreover, these potential bystanders may play a positive role to prevent IPV problem by challenging violence-related social norms [28].

For these reasons, the focus of our two empirical studies (see Chapters 4 and 5) was on bystander intervention and the factors that may affect university students' decisions to provide support and help in the face of IPV circumstances.

Following the suggestion of Banyard's [27] review, in both studies, we applied a socio-ecological IPV bystander model, which merges Latané and Darley's model [202] with Bronfenbrenner's [58] ecological model, in order to obtain a broader view of the factors involved in this phenomenon.

Moreover, given that some evidence showed that online settings are suitable contexts to implement research and intervention about IPV and bystander approach (e.g., [87, 185, 381]), we decided to use online tools such as synchronous online focus groups and web-based questionnaires in our empirical studies.

To best of our knowledge, in Italy, no one study investigated bystander intervention in the case of IPV with university student participants.

Using a qualitative method, the first study presented in Chapter 4 attempts to describe individuals' perceptions of IPV and how they think to deal with it, exploring the role of the peer group and the friendship with the aggressor, and gender differences.

By adopting a quantitative method, the second study presented in Chapter 5 seeks to detect which sets of factors may influence the intent to help a friend or a stranger involved in sexual violence and IPV circumstances, highlighting possible cultural differences among Italian, Brazilian and French-Canadian university students.

Based on literature review (see Chapter 2), we also developed two stochastic agent-based models for simulating the influence of individual (i.e., aggressiveness) and social parameters (i.e., perceived violence and received informal social support) and their interactions on the dynamics of IPV (see Chapter 6).

These three studies, despite differences in methods, highlight the social influence of members of own informal social networks on dynamics of IPV.

Indeed, in the qualitative study participants reported that the behavior of the bystander could be influenced by peer group and its gender composition, highlighting the conformism to stereotyped social norms related to prosocial behavior and gender.

The influence of social norms is also confirmed by the second quantitative study in which the peer helping norms is a variable that affects the intent to help a friend and a stranger both for whole sample results and for each subsample results with participants that perceived their friends as helpful bystanders were more likely to help a friend and a stranger.

Finally, the first stochastic ABM showed an interesting result that if the own tendency to perpetrate violence is supported by a high perception of in-group's IPV perpetration than the violent behavior will become more acceptable among in-group members and it will be spread in a society.

These results have different explanations. As classical literature indicate [212, 319], individuals usually prefer to conform to social norms. For example, gender differences about prosocial behaviors might fit with social expectations of gender role (e.g., [111]). Moreover, bystander might seek social cues in the face of ambiguous problem [201] and, therefore, bystander intervention could be affected by the level of seriousness that a specific form of IPV has within a community [100, 253], and by the perceived peer norms about violence [59]. Finally, having IPV in the social network, living in a community supporting a tolerant attitudes toward IPV and living in a society characterized by gender inequality social norms might increase the risk of experiencing and legitimating IPV [53, 187, 287, 304].

7.2 Limitations of the Research

There are two main limitations of this thesis. The first limit is related to the empirical studies conducted which were based on voluntary participation with a smaller number of males in both the qualitative and quantitative

study. A selection bias might have occurred with individuals more sensitive of the issue of IPV accepting to participate in both studies.

The second limit concerns instead the two stochastic agent-based models. They are simplified models of the dynamics of IPV that does not take into account some factors that can increase the risk to suffer and perpetrate IPV, such as a history of childhood abuse.

Given these limitations, it is important to consider that the qualitative study is a first step toward better understanding about factors which affect bystander intervention in the Italian context. Moreover, the cross-cultural quantitative study is one of the few research that tried to find out macrosystem influence on bystander intent to help. Finally, the two stochastic agent-based models are the second attempt to study the interactive and complex dynamic of IPV through an application of agent-based modeling.

7.3 Research and Practical Implications

Despite these limitations, the findings of our studies have some research and practical implications.

First of all, research in the field of IPV and bystander intervention should use online instruments such as web-based questionnaires and SOFGs given that participants of this research have expressed and reported opinions that were socially undesirable or sensitive.

Secondly, the importance of social norms on the dynamics of IPV and bystander intervention suggests that IPV prevention that attempts to give a positive role to community members such as bystander approach should stress not only the influence of social norms on own bystander intervention but also their responsibility to increase the rates of IPV in a given society if they are bearers of supporting IPV norms [28]. Moreover, these aspects might have an important implication also in the field of policies against IPV. Indeed policies to prevent IPV should be not only present in a society but also shared with its members [302].

Lastly, the results of our research indicate an important role of gender in IPV prevention, especially for bystander approach. Indeed, findings from qualitative and quantitative studies point out that females seem to be more likely to offer helpful bystander intervention in IPV situations than males. However, the qualitative results find that being a friend of a perpetrator implicates more unhelp behaviors for females than males and the quantita-

tive results show no gender differences in the intent to help a friend and a stranger in the Italian subsample. Finally, simulations results of the second stochastic agent-based models suggest that social support is able to prevent IPV, regardless the sex of who provides it. Thus, bystander approach should focus on skills to face the gender-specific barriers of IPV situations.

7.4   Future Research

This research shed light on significant aspects of IPV such as its dynamics and the factors that might affect it by means of different methods.

More specifically, ABM approach has allowed us to modify some parameters such as the level of aggressiveness toward a partner (a) and the level of perceived informal social support (s), letting them evolve as a function of perceived violence (v) and simulating their consequences on the dynamics of IPV. Furthermore, to identify the most important factors related to bystander intervention, we collected empirical data. Then, we compared the results from simulations and qualitative and quantitative studies in order to have a broader understanding of IPV dynamics.

One of the main features of the ABM is simplicity, in other words this method allows researchers to simulate the emergence of a macroscopic phenomenon (e.g., IPV) starting from a minimal set of parameters (e.g., a, s, v) [251].

ABM is also flexible [251]. Thus, future research could further develop the two stochastic agent-based models presented in this dissertation by taking into account new parameters that might affect IPV dynamics. Therefore our models can be considered as an example for future applications.

As suggested by Capaldi's review [75], community levels risk factors for IPV are not clear, thus research should more analyze this level of influence and ABM approach might simulate environments with less/more neighborhood disadvantage or smaller/higher collective efficacy.

Finally, this thesis seems to confirm that social norms may impact IPV dynamics. Adolescence is a stage of life in which individuals are strongly influenced by perceived peer norms that shape adolescent behaviors [240]. During this period, boys and girls also start to establish their first romantic relationships [93] which may be sometimes already characterized by violence (i.e., dating violence – DV) [146]. Not many studies have investigated couple dynamics in adolescents, identifying specific patterns of DV (e.g., [120, 322]).

Therefore, it might be interesting for future studies to explore DV dynamics adapting and extending our ABM models in order to better understand this problematic issue.

Appendix A

Appendix

This appendix is related to transition matrices, previously presented in Chapter 6. Here transition matrices of Model 1 (see Section 6.3) and of Model 2 (see Section 6.5).

A.1   Transition Matrices of Model 1 in Section 6.3 and of Model 2 in Section 6.5

Table A.1: The Transition Matrix $\tau(s_i'|s_i, s_j)$ of Model 1 starting from State $s_i = -1$ (Passive)

s_i'	s_i	s_j	$\tau(s_i'|s_i, s_j)$	Illustration
-1	-1	0	0	myself passive, spouse neutral → passive: not contemplated
0	-1	0	1	myself passive, spouse neutral → normal: default
1	-1	0	0	myself passive, spouse neutral → upset: not contemplated
2	-1	0	0	myself passive, spouse neutral → violent: not contemplated
-1	-1	-1	0	myself passive, spouse passive → passive: not contemplated
0	-1	-1	1	myself passive, spouse passive → normal: default
1	-1	-1	0	myself passive, spouse passive → upset: not contemplated
2	-1	-1	0	myself passive, spouse passive → violent: not contemplated
-1	-1	1	$1 - a$	myself passive, spouse upset → passive: not assertiveness
0	-1	1	0	myself passive, spouse upset → normal: not contemplated
1	-1	1	a	myself passive, spouse upset → upset: assertiveness
2	-1	1	0	myself passive, spouse upset → violent: not contemplated
-1	-1	2	1	myself passive, spouse violent → passive: passivity (absorbing state)
0	-1	2	0	myself passive, spouse violent → normal: not contemplated
1	-1	2	0	myself passive, spouse violent → upset: not contemplated
2	-1	2	0	myself passive, spouse violent → violent: not contemplated

Table A.2: The Transition Matrix $\tau(s_i'|s_i,s_j)$ of Model 1 starting from State $s_i = 0$ (Normal)

s_i'	s_i	s_j	$\tau(s_i'|s_i,s_j)$	Illustration
-1	0	0	0	myself neutral, spouse neutral → passive: not contemplated
0	0	0	1	myself neutral, spouse neutral → normal: normal (absorbing state)
1	0	0	0	myself neutral, spouse neutral → upset: not contemplated
2	0	0	0	myself neutral, spouse neutral → violent: not contemplated
-1	0	-1	0	myself neutral, spouse passive → passive: not contemplated
0	0	-1	1	myself neutral, spouse passive → normal: default
1	0	-1	0	myself neutral, spouse passive → upset: not contemplated
2	0	-1	0	myself neutral, spouse passive → violent: not contemplated
-1	0	1	$1-a$	myself neutral, spouse upset → passive: not assertiveness
0	0	1	0	myself neutral, spouse upset → normal: not contemplated
1	0	1	a/4	myself neutral, spouse upset → upset: assertiveness
2	0	1	3a/4	myself neutral, spouse upset → violent: aggressiveness
-1	0	2	$1-a$	myself neutral, spouse violent → passive: not aggressiveness
0	0	2	0	myself neutral, spouse violent → normal: not contemplated
1	0	2	0	myself neutral, spouse violent → upset: not contemplated
2	0	2	a	myself neutral, spouse violent → violent: aggressiveness

Table A.3: The Transition Matrix $\tau(s_i'|s_i, s_j)$ of Model 1 starting from State $s_i = 1$ (Upset)

s_i'	s_i	s_j	$\tau(s_i'|s_i, s_j)$	Illustration
-1	1	0	$1-a$	myself upset, spouse neutral → passive: not assertiveness
0	1	0	0	myself upset, spouse neutral → normal: not contemplated
1	1	0	$a/4$	myself upset, spouse neutral → upset: assertiveness
2	1	0	$3a/4$	myself upset, spouse neutral → violent: aggressiveness
-1	1	-1	$1-a$	myself upset, spouse passive → passive: not assertiveness
0	1	-1	0	myself upset, spouse passive → normal: not contemplated
1	1	-1	0	myself upset, spouse passive → upset: not contemplated
2	1	-1	a	myself upset, spouse passive → violent: aggressiveness
-1	1	1	$1-a$	myself upset, spouse upset → passive: not assertiveness
0	1	1	0	myself upset, spouse upset → normal: not contemplated
1	1	1	0	myself upset, spouse upset → upset: not contemplated
2	1	1	a	myself upset, spouse upset → violent: aggressiveness
-1	1	2	$1-a$	myself upset, spouse violent → passive: passivity
0	1	2	0	myself upset, spouse violent → normal: not contemplated
1	1	2	0	myself upset, spouse violent → upset: default
2	1	2	a	myself upset, spouse violent → violent: aggressiveness

Table A.4: The Transition Matrix $\tau(s_i'|s_i, s_j)$ of Model 1 starting from State $s_i = 2$ (Violent)

s_i'	s_i	s_j	$\tau(s_i'|s_i, s_j)$	Illustration
-1	2	0	$1 - a$	myself violent, spouse neutral → passive: false passivity
0	2	0	0	myself violent, spouse neutral → normal: not contemplated
1	2	0	0	myself violent, spouse neutral → upset: not contemplated
2	2	0	a	myself violent, spouse neutral → aggressiveness
-1	2	-1	0	myself violent, spouse passive → passive: not contemplated
0	2	-1	0	myself violent, spouse passive → normal: non contemplated
1	2	-1	0	myself violent, spouse passive → upset: not contemplated
2	2	-1	1	myself violent, spouse passive → violent: aggressiveness (absorbing state)
-1	2	1	1-a	myself violent, spouse upset → passive: false passivity
0	2	1	0	myself violent, spouse upset → normal: not contemplated
1	2	1	0	myself violent, spouse upset → upset: not contemplated
2	2	1	a	myself violent, spouse upset → violent: aggressiveness
-1	2	2	0	myself violent, spouse violent → passive: not contemplated
0	2	2	0	myself violent, spouse violent → normal: not contemplated
1	2	2	0	myself violent, spouse violent → upset: not contemplated
2	2	2	1	myself violent, spouse violent → violent: prelude to separation (absorbing state)

Table A.5: The Transition Matrix $\tau_3(s_i'|s_i,s_j)$ of Model 2 starting from State $s_i = -1$ (Passive)

s_i'	s_i	s_j	$\tau_3(s_i'|s_i,s_j)$	Illustration
-1	-1	0	0	myself passive, spouse neutral → passive: not contemplated
0	-1	0	1	myself passive, spouse neutral → neutral: default
1	-1	0	0	myself passive, spouse neutral → upset: not contemplated
2	-1	0	0	myself passive, spouse neutral → violent: not contemplated
-1	-1	-1	0	myself passive, spouse passive → passive: not contemplated
0	-1	-1	1	myself passive, spouse passive → neutral: default
1	-1	-1	0	myself passive, spouse passive → upset: not contemplated
2	-1	-1	0	myself passive, spouse passive → violent: not contemplated
-1	-1	1	1	myself passive, spouse upset → passive: default
0	-1	1	0	myself passive, spouse upset → neutral: not contemplated
1	-1	1	0	myself passive, spouse upset → upset: not contemplated
2	-1	1	0	myself passive, spouse upset → violent: not contemplated
-1	-1	2	1	myself passive, spouse violent → passive: default
0	-1	2	0	myself passive, spouse violent → neutral: not contemplated
1	-1	2	0	myself passive, spouse violent → upset: not contemplated
2	-1	2	0	myself passive, spouse violent → violent: not contemplated

Table A.6: The Transition Matrix $\tau_3(s_i'|s_i, s_j)$ of Model 2 starting from State $s_i = 0$ (Normal)

s_i'	s_i	s_j	$\tau_3(s_i'|s_i, s_j)$	Illustration
-1	0	0	0	myself neutral, spouse neutral → passive: not contemplated
0	0	0	s	myself neutral, spouse neutral → neutral: support
1	0	0	$1 - s$	myself neutral, spouse neutral → upset: negative episode + lack of support
2	0	0	0	myself neutral, spouse neutral → violent: not contemplated
-1	0	-1	0	myself neutral, spouse passive → passive: not contemplated
0	0	-1	1	myself neutral, spouse passive → neutral: default
1	0	-1	0	myself neutral, spouse passive → upset: not contemplated
2	0	-1	0	myself neutral, spouse passive → violent: not contemplated
-1	0	1	0	myself neutral, spouse upset → passive: not contemplated
0	0	1	s	myself neutral, spouse upset → neutral: support
1	0	1	$1 - s$	myself neutral, spouse upset → upset: lack of support
2	0	1	0	myself neutral, spouse upset → violent: not contemplated
-1	0	2	0	myself neutral, spouse violent → passive: not contemplated
0	0	2	1	myself neutral, spouse violent → neutral: default
1	0	2	0	myself neutral, spouse violent → upset: not contemplated
2	0	2	0	myself neutral, spouse violent → violent: not contemplated

Table A.7: The Transition Matrix $\tau_3(s_i'|s_i,s_j)$ of Model 2 starting from State $s_i = 1$ (Upset)

s_i'	s_i	s_j	$\tau_3(s_i'|s_i,s_j)$	Illustration
-1	1	0	s	myself upset, spouse neutral → passive: support
0	1	0	0	myself upset, spouse neutral → neutral: not contemplated
1	1	0	$1-s$	myself upset, spouse neutral → upset: lack of support
2	1	0	0	myself upset, spouse neutral → violent: not contemplated
-1	1	-1	1/2	myself upset, spouse passive → passive: may happen
0	1	-1	1/2	myself upset, spouse passive → neutral: may happen
1	1	-1	0	myself upset, spouse passive → upset: not contemplated
2	1	-1	0	myself upset, spouse passive → violent: not contemplated
-1	1	1	s	myself upset, spouse upset → passive: support
0	1	1	0	myself upset, spouse upset → neutral: not contemplated
1	1	1	0	myself upset, spouse upset → upset: not contemplated
2	1	1	$1-s$	myself upset, spouse upset → violent: lack of support
-1	1	2	0	myself upset, spouse violent → passive: not contemplated
0	1	2	0	myself upset, spouse violent → neutral: not contemplated
1	1	2	1	myself upset, spouse violent → upset: default
2	1	2	0	myself upset, spouse violent → violent: not contemplated

Table A.8: The Transition Matrix $\tau_3(s_i'|s_i, s_j)$ of Model 2 starting from State $s_i = 2$ (Violence)

s_i'	s_i	s_j	$\tau_3(s_i'|s_i, s_j)$	Illustration
-1	2	0	0	myself violent, spouse neutral $\rightarrow$ passive: not contemplated
0	2	0	1	myself violent, spouse neutral $\rightarrow$ neutral: default
1	2	0	0	myself violent, spouse neutral $\rightarrow$ upset: not contemplated
2	2	0	0	myself violent, spouse neutral $\rightarrow$ violent: not contemplated
-1	2	-1	1	myself violent, spouse passive $\rightarrow$ passive: default
0	2	-1	0	myself violent, spouse passive $\rightarrow$ neutral: not contemplated
1	2	-1	0	myself violent, spouse passive $\rightarrow$ upset: not contemplated
2	2	-1	0	myself violent, spouse passive $\rightarrow$ violent: not contemplated
-1	2	1	0	myself violent, spouse upset $\rightarrow$ passive: not contemplated
0	2	1	0	myself violent, spouse upset $\rightarrow$ neutral: not contemplated
1	2	1	0	myself violent, spouse upset $\rightarrow$ upset: not contemplated
2	2	1	1	myself violent, spouse upset $\rightarrow$ violent: default
-1	2	2	0	myself violent, spouse violent $\rightarrow$ passive: not contemplated
0	2	2	s	myself violent, spouse violent $\rightarrow$ neutral: prelude of separation (support)
1	2	2	0	myself violent, spouse violent $\rightarrow$ upset: not contemplated
2	2	2	$1 - s$	myself violent, spouse violent $\rightarrow$ violent: increase of violence (lack of support)

Appendix B

Publications

Below, the overall publications since the beginning of the doctorate.

International Journals

1. T. Van Camp, M. Hébert, **E. Guidi**, F. Lavoie, M. Blais, members of the PAJ Project. "Teens' self-efficacy to deal with dating violence as victim, perpetrator or bystander", *International Review of Victimology*, vol. 20, iss. 3, pp. 289-303, 2014. [DOI:10.1177/0269758014521741]

2. A. Guazzini, C. Cecchini, **E. Guidi**, M. Milani, P. Meringolo. "Excessive Self-Presentation on Facebook. One Year of Analysis on Posting Online", *Frontiers in Psychological and Behavioral Science*, vol. 5, iss. 1, pp. 16-27, 2016.

3. **E. Guidi**, G. Magnatta, A. Guazzini, P. Meringolo. "Intimate partner sexual violence: an overview of the problem in Italy", *The Australian Community Psychologist*, vol. 28, iss. 1, pp. 101-116, 2016.

4. A. Guazzini, C. Cecchini, **E. Guidi**. "Small Group Processes on Computer Supported Collaborative Learning", In F. Bagnoli, A. Satsiou, I. Stavrakakis, P. Nesi, G. Pacini, Y. Welp, T. Tiropanis, and D. DiFranzo (Eds.). *International Conference on Internet Science*, pp. 123-132, 2016. [DOI : $10.1007/978 - 3 - 319 - 45982 - 0_12$]

5. M. Hébert, R. Langevin, **E. Guidi**, A. C. Bernard-Bonnin, C. Allard-Dansereau. "Sleep Problems and Dissociation in Preschool Victims of Sexual Abuse", *Journal of Trauma & Dissociation*, Published online, 2016. [DOI: 10.1080/15299732.2016.1240739]

6. R. Langevin, M. Hébert, **E. Guidi**, A. C. Bernard-Bonnin, C. Allard-Dansereau. "Sleep problems over a year in sexually abused preschoolers", *Paediatrics & Child Health*, vol. in press.

Submitted

1. **E. Guidi**, P. Meringolo, A. Guazzini, F. Bagnoli. "Stochastic Agent-Based Models of Intimate Partner Violence", *Journal of Artificial Societies and Social Simulation*, 2016 (Submitted).

Electronic preprints

1. A. Guazzini, **E. Guidi**, C. Cecchini, M. Milani, P. Meringolo. "Self-presentation and emotional contagion on Facebook: new experimental measures of profiles' emotional coherence", *arXiv preprint arXiv:1607.07243*, 2016.

2. **E. Guidi**, P. Meringolo, A. Guazzini, F. Bagnoli. "Stochastic Agent-Based Models of Intimate Partner Violence", *arXiv preprint arXiv:1611.06544*.

International Conferences and Workshops

1. C. Cecchini **E. Guidi**. "Narcissism and self-presentation on Facebook: A sentiment analysis of adolescences' on-line interactions", in *Proc. of Codym Spring Workshop*, Wroclaw (Poland), 2014.

2. P. Meringolo **E. Guidi**, C. Cecchini, A. Guazzini. "Learning performance of collaborative and non collaborative groups in a virtual environment", in *Proc. of Community Psychology in the current world: Challenges, Limit and Practices*, Fortaleza (Ceará, Brazil), 2014. [ISBN: 9788574852270]

3. **E. Guidi**, B. P. H. Mandelbaum, N. Bosco, A. Guazzini, P. Meringolo. "How can Bystander Intervention change?: An Online Qualitative Study in Italy and Brazil", in C. Pracana, M. Wang (Eds.) *Proc. of International Psychological Applications Conference and Trends*, Lisbon (Portugal), 2016. [ISBN: $978 - 989 - 99389 - 6 - 0$]

4. N. Bosco, A. Guazzini, **E. Guidi**, S. Giaccherini, P. Meringolo. "Self-Stigma in Mental Health: Planning Effective Programs for Teenagers", in C. Pracana, M. Wang (Eds.) *Proc. of International Psychological Applications Conference and Trends*, Lisbon (Portugal), 2016. [ISBN: $978 - 989 - 99389 - 6 - 0$]

5. R. Langevin, M. Hébert, **E. Guidi**, A. C. Bernard-Bonnin, C. Allard-Dansereau. "Sleep problems in sexually abused preschoolers and their mediation effects on behavior problems", in *Proc. of International Family*

Violence and Child Victimization Research Conference, Portsmouth (NH, United States), 2016.

National Conferences

1. **E. Guidi**, N. Bosco, M. Dolfi, E. Redolfi, F. Piatti, P. Meringolo. "Le competenze interculturali del personale infermieristico in Toscana. Effetti di un intervento formativo", in D. Mazzoni, I. Barbieri, G. Prati, E. Cicognani, C. Albanesi *Proc. of Costruire comunità ospitali e sostenibili. Nuove sfide per la Psicologia di Comunità*, Bologna, Italy, 2014. [ISBN: 9788898010189] [DOI: 10.6092/*unibo/amsacta*/4036]

2. C. Cecchini, **E. Guidi**, A. Guazzini, P. Meringolo. "Learning Performance in Ambiente Virtuale", in D. Mazzoni, I. Barbieri, G. Prati, E. Cicognani, C. Albanesi *Proc. of Costruire comunità ospitali e sostenibili. Nuove sfide per la Psicologia di Comunità*, Bologna, Italy, 2014. [ISBN: 9788898010189] [DOI: 10.6092/*unibo/amsacta*/4036]

3. **E. Guidi**, C. Cecchini. "Collaborative and non-collaborative learning of small groups in virtual environments", in *Proc. of La psicologia fiorentina: 110 anni e oltre*, Florence, Italy, 2014. **(Best poster award: Social section)**

4. P. Meringolo, A. M. Giannoni, D. Trambusti **E. Guidi**. "La resilienza nella scuola e nella comunità locale. Una iniziativa formativa per gli insegnanti di istituti di istruzione superiore di Firenze e dell'area vasta fiorentina", in *Proc. of Costruire Insieme La Salute. Programmi ed interventi di promozione della salute. Programma Guadagnare salute*, Orvieto (Terni), Italy, 2014.

5. **E. Guidi**. "Understanding the small group processes on computer-mediated collaborative learning", in *Proc. of PhD 6 Abstract booklet*, Sesto Fiorentino (Florence), Italy, 2015.

6. **E. Guidi**, C. Cecchini, M. Milani, A. Guazzini. ""Online self-presentation" e contagio emotivo su Facebook: uno studio longitudinale", in *Proc. of Psicologia della Salute e Salute della Psicologia*, Catania, Italy, 2015. [ISBN: 9788863180084]

7. C. Cecchini, **E. Guidi**, M. Milani, A. Guazzini. "Il Narcisismo online: uno studio longitudinale su Facebook", in *Proc. of Psicologia della Salute e Salute della Psicologia*, Catania, Italy, 2015. [ISBN: 9788863180084]

8. **E. Guidi**, C. Cecchini, M. Milani, P. Meringolo, A. Guazzini. "Excessive self-presentation in adolescents: the case of Facebook", in *Proc. of Biophys'15. From physics to biology and beyond*, Sesto Fiorentino (Florence), Italy, 2015.

9. **E. Guidi**. "Nonlinear dynamics of intimate partner violence", in *Proc. of PhD 7 Abstract booklet*, Sesto Fiorentino (Florence), Italy, 2016.

10. **E. Guidi**, A. Guazzini. "Ignorare o intervenire? Il punto di vista dei giovani rispetto alla violenza nelle coppie", in *Frontiere di comunità. Complessità a confronto*, Bergamo, Italy, 2016.

11. P. Meringolo, **E. Guidi**, A. Guazzini. "Effetto bystander in ambiente virtuale", in *Proc. of XIV Congresso Nazionale della Sezione di Psicologia Sociale dell'AIP*, Naples, Italy, 2016. [ISBN: $978 - 88 - 941762 - 1 - 6$]

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