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Chapter 1

General Introduction
Very often in our culture drinking alcohol is portrayed as a substance that heals, calms, enlightens, and fulfills our human need for affection. Throughout the globe, regardless of cultural context, drinking alcohol has managed to maintain a status of a socially accepted drug over many centuries: whether we talk about a cultural event, a celebration, or a dance party, alcohol has always been present to “lighten people’s spirits” therefore contributing to the development of social relationships.

In terms of emotional comfort it was our belief that no amount of physical contact could match the healing powers of a well made cocktail. David Sedaris (1998), comedian, resumes in his autobiography how drinking alcohol and implicitly dealing with alcohol dependence is very well connected to our emotional life. At this stage experts and other people involved in drinking agree that there is also a downside of alcohol use which is the opposite of calmness and connection, notably social isolation, addiction, and interpersonal conflicts.

Alcohol’s impact on behavior has been documented to be both positive and negative, contributing to the development of social relationships and at the same time making people to act violently (Moss & Albery, 2009). To begin with, people consume alcohol in social situations with the purpose to enhance their experience of socialization, to conform to peers, or to make themselves feel less anxious (cope with negative feelings) and more outgoing while with others (Peele & Brodsky, 2000). This phenomenon is a consequence of the positive social beliefs that alcohol is a “social lubricant” (Monahan & Lianutti, 2000) and possible negative consequences are often disregarded.

Yet, within the context of pointing to the downside of alcohol use, statistics from the World Health Organization (WHO, 2018) report that about 70% percent of young people aged above 15 years of age consume alcohol across all countries in Europe. Furthermore, approximately 12% of Europe’s total population suffers from an alcohol use disorder (AUD; see next section for diagnostic criteria). AUD represents the primary outcome of a problematic use of alcohol that is often linked to health problems and interpersonal problems. Because it is widely agreed upon that hazardous alcohol consumption has various negative consequences, such as health problems, risky behaviors, and interpersonal problems (Chauvise et al., 2018; Cunradi et al., 2020; Gilchrist et al., 2017), researchers aimed to establish the mechanisms through which substance use impacts behavior.
The present thesis takes a clinical perspective on alcohol use, in particular how we can better understand alcoholism by looking at psychological processes that help explain long term effects of (drinking) alcohol, and how these long-term effects are associated with problems. Given the above premise that the widespread use of alcohol is connected with relevant interpersonal outcomes, the main focus of the current research is on (components of) empathy as an element of social cognition that might help clarify why drinking alcohol leads to interpersonal problems in some people.

**From positive acute alcohol effects to negative long-term effects**

Acute alcohol consumption that generally arises in social situations has many potential social benefits, particularly people reporting a relief of negative affect, and anxiety reduction which has been studied in the past under the “tension reduction” theory proposed by Cogner (1956) when studying mechanisms involved in alcohol use (Kushner et al., 1994). These short-term positive alcohol effects also contributed to the development of the “alcohol as a social lubricant” theory, where the positive effects are proposed to contribute to better social relationships. However, there were studies that did not find enough evidence for the tension reduction theory (Greely & Oei, 1999) and researchers came across clues indicating that the beneficial effects of alcohol consumption in social situations do not arise in all circumstances and among all people (Sayette, 2017).

It is true that long-term negative consequences arise when drinking alcohol becomes problematic, specifically when frequent episodes of drinking occur, with a pattern of drinking that involves five or more drinks on occasion for men and four or more drinks on occasion for women (McKnight-Eily et al., 2017). When consumed frequently and in large quantities, alcohol further becomes associated with aggression acts, accidents, and addiction (Bora & Zorlu, 2017). Aggressive acts are sometimes meant to physically or psychologically hurt other people (proactive aggression) and other times arise as a consequence of poor emotional regulation, also known as reactive aggression (Garcia-Sancho et al., 2014). Experimental studies have shown that alcohol consumption often elicits reactive aggression (Chermack & Giancola, 1997; Murdoch et al., 1990). Correlational studies have demonstrated more episodes of aggression in acute alcohol intoxication episodes in people.
diagnosed with an AUD (Jaffe et al., 2015, Murphy & O’Farrell, 1994), meaning that while intoxicated with alcohol, people that are already dependent are more likely to engage in interpersonal conflicts with others that can quickly escalate into violence compared to people who are not dependent.

Consequently, another problematic outcome of heavy alcohol use is the development of Alcohol Use Disorder (AUD). For this diagnosis to be made, the Diagnostic and Statistical Manual for Mental Disorders (DSM, fifth edition) requires at least two of the following criteria occurring within at least one year period: alcohol ingestion in larger amounts and over longer periods than intended, a persistent desire that undermines efforts to control intake, an important amount of time is spent in order to obtain, use and recover from alcohol, craving, alcohol use results in failing to fulfill responsibilities at home or work, continuous alcohol use despite interpersonal and social problems caused by alcohol, other important social or occupational activities are reduced in order to consume alcohol, recurrent use in situations when it becomes dangerous, consumption is continued despite knowing that it has become a psychological problem, and not lastly, tolerance to alcohol and withdrawal (American Psychiatric Association, 2013). Clinical evidence suggests that individuals diagnosed with an AUD have difficulties in social functioning, related to spousal problems, involvement in aggressive acts and, relatedly, they might lack social support (Chermack & Giancola, 1997; Gmel & Rehm, 2003; Murdoch & Ross, 1990a).

It is still unclear what the mechanisms are that might explain why alcohol use is associated with interpersonal problems. Possible drinking motives were previously examined to establish why some people use alcohol problematically, and others not. Therefore, researchers identified four possible motives that people have to engage into alcohol consumption, namely: to enhance the experience of socialization, to be more sociable while with others, to conform to others, to cope with negative affect. Previous studies have primarily associated the negative and internal drinking motive (i.e., coping with negative affect) with a problematic alcohol use pattern (Kuntsche et al., 2005). See Figure 1 (left part). In sum, although alcohol is known to have beneficial effects related to socialization, it is sometimes associated with problematic interpersonal outcomes. Consequently, it is important to study the mechanisms of alcohol’s effects on psychological processes relevant to interpersonal functioning, such as social cognition.
Effects of alcohol on social cognition

To better understand the effects of alcohol on social cognition, this thesis focuses on different aspects of empathy as an important component of social cognition (see Figure 1, right side). Social cognition represents a multidimensional construct that encompasses the ability to perceive, identify, and interpret information from the external social world (Frith & Frith, 2007). Social cognition involves processes like emotion recognition, empathic abilities, theory of mind (ToM), and morality (Bora & Zorlu, 2017). Previous systematic reviews on studies that examined social cognition processes in alcoholism found that patients diagnosed with alcoholism have difficulties in decoding other’s emotions, and poor ToM and empathy skills (Le Berre, 2019; Uekerman & Daumm, 2008). In particular, clinical studies reported that individuals with AUD perform lower at facial recognition tasks, compared to individuals without AUD (D’Hondt et al. 2014). Further, one meta-analysis that examined both cognitive and affective empathy found that deficits in cognitive empathy are also associated with alcoholism, but not deficits in affective empathy (Kumar et al., 2022). In addition, ToM, which involves the inferring of others’ thoughts and emotions and as such is closely related to cognitive empathy, was also found to be negatively affected in alcoholism (Bosco et al., 2014). Altogether chronic alcohol abusers have impaired social cognition abilities including worse emotion recognition, low cognitive empathy, and poor ToM, but how alcohol affects these abilities is still unclear. Experimental studies found some alcohol effects on facial emotion recognition, particularly at higher doses on negative emotions (Nagar et al., 2021; Sripada et al., 2011) and showed that the implicit perception of cues related to inappropriate sexual behavior was clearly impaired by alcohol (Karlen et al., 2019; Loiselle & Fuqua, 2007). Social cognition ability is related to important skills such as emotion recognition, humor processing, and empathy, that all are argued to play a role in the recovery process in alcoholism; thus, understanding the effect of alcohol on social cognition might provide clues to help improve the recovery from alcohol related problems.
Figure 1. The proposed model of the relationship between alcohol and social cognition

From social cognition to empathy

The present dissertation will zoom into one important component of social cognition: empathy. Empathy is a multidimensional construct, and comprises cognitive, affective and behavioral components (see Figure 2). Cognitive empathy is the rational understanding of others’ feelings, and affective empathy is the emotional response to others’ feelings (Decety, 2010). Behavioral empathy is characterized by the action-oriented result of cognitive and emotional empathy, such as helping others while in painful situations (Tamayo et al., 2016). Altogether, these separate aspects of empathy contribute to and have an important role in appropriate social functioning, namely higher order cognitive understanding of others’ feelings (cognitive empathy) and the ability to feel others’ pain (affective empathy) facilitate taking action and behaviorally manifesting empathy by helping (behavioral empathy). One important consequence of appropriate social functioning is that empathy has a role in preventing the aggression that occurs often after problematic alcohol use (Björkqvist et al., 2000).
The neurocognitive mechanisms of affective and cognitive empathy components might be explained by the dual route model proposed by Yu and Chou (2018). This model proposes two different neurocognitive routes for behavioral empathy, namely a fast route and a slow route. The fast route depicts the affective component, it is the subcortical self-latency pathway that directly transmits sensory information from the thalamus to the amygdala. On this route stimuli are rapidly processed without awareness or consciousness. The slow route describes higher order processing of cognitive empathy, starting from the visual pathway to the retinal neurons and visual cortex, then linking to the inferior temporal lobe in order to process higher level consciousness of emotional information that in the end reaches the amygdala (Yu & Chou, 2018).

Figure 2. The dual route model proposed by Yu and Chou, 2018

*The role of social cognition in preventing aggression*

Giancola and colleagues employed several experimental studies that examined the direct effect of an acute alcohol dose on human aggression. The results of these experiments underlined several key aspects concerning the alcohol-aggression
relationship: alcohol increases aggression particularly in men with higher levels of irritability (Giancola, 2002a. Giancola, 2001b), with difficult personality traits (Giancola, 2004, Giancola et al., 2006), and with lower trait empathy levels (Giancola, 2003). Given these findings, researchers conceptualized a theoretical framework in order to explain alcohol’s effects on human aggression: the alcohol myopia model (Giancola et al., 2010). The alcohol myopia model aimed at explaining the disinhibition effects of alcohol on behavior by postulating a narrowing alcohol effect on one’s ability to process salient cues for provocation and an inability to inhibit a possible aggressive response. In order to unfold the possible explanatory mechanisms of this aggression-alcohol link, researchers established five key mechanisms involved: negative affect, anger, hostile cognitive rumination, self-awareness, and empathy (Giancola et al., 2010). Following this, the impairing effects of alcohol on empathy might be a part of the explanatory mechanism for the alcoholism and aggression association. In particular people that drink alcohol to cope with negative feelings might also have altered empathic abilities that put them at risk of having aggressive reactions as one possible type of interpersonal problem, particularly if they already have low empathy skills (Figure 1).

The present thesis proposes a theoretical model wherein deficits in social cognition might exist a priori in individuals, thus explaining social problems that in turn lead to a vulnerability to problematic drinking patterns that develop into alcoholism. Therefore, continued alcohol use further maintains these deficits and then results in more problems, for instance aggressive acts towards others. Alongside the impact of the hypothesized premorbid characteristics, there might be a direct effect of problematic alcohol use on empathy, that in turn also causes interpersonal problems and then the drinking cycle is sustained. Both hypotheses can exist alongside one another, and I aimed at considering both possibilities when studying mechanisms of alcohol drinking (see Figure 1).

Methodological considerations

Studies have used different designs in order to understand better the association between alcohol, social cognition and alcohol related problems. From one perspective, clinical case control studies that examined individuals diagnosed with alcoholism by using self-report questionnaires have found that in these people
(compared to similar individuals without substance abuse) social cognitive processes were clearly altered (Bora & Zorlu, 2017; Castellano et al., 2015; Le Berre, 2019; Onuoha et al., 2016). In addition, cross-sectional studies carried out in young drinkers (college students and adolescents) also used simple questionnaires in order to measure the relationship between levels of alcohol use, motives, and social cognition traits (Laghi et al., 2016; 2019; 2021). In comparison, to study immediate alcohol effects on various variables, experimental designs were employed in order to test social processes in social drinkers after drinking an acute alcohol dose. As an example, the experimental studies that examined various alcohol doses’ effects on aggression (Giancola, 2002; Giancola, 2003; Giancola, 2004) had a general design that outlined the following procedures: the screening of participants for AUD and assessment of their previous alcohol consumption, thus excluding individuals with alcoholism, then random allocation to either the alcohol or placebo condition. Additionally, the beverage administration procedure was also controlled by making participants believe that they received the same drink, and then an equal time for an absorption period was involved (Giancola et al., 2011).

Similarly, to the design of experimental studies that tested the alcohol effects on human aggression, a study by Thiel et al. (2018) tested the effect of a moderate dose of alcohol on empathic accuracy in male social drinkers. They assessed empathic accuracy as a form of cognitive empathy, referring to people’s ability to identify a target’s feelings from videos in which targets talked about autobiographical emotional events. The results showed that people with low Alcohol Use Disorders Identification Test (AUDIT) scores had a reduced empathic accuracy after alcohol consumption, a conclusion in line with the idea that alcohol can impair cognitive empathy.

Previous studies that tapped into social cognition aspects used very different measures, for example a simple facial emotion recognition task was used by D‘Hondt et al. (2014) that is most likely to measure only a cognitive component of empathy. The measures used to assess empathy have been developed over time in order to distinguish between trait and state levels of empathy. Firstly, self-report questionnaires were employed to assess trait affective and sometimes cognitive forms of empathy (e.g. The Interpersonal Reactivity Index or IRI, Davis, 1980; The Empathy Quotient or EQ, Baron-Cohen et. al., 2004; The Balanced Emotional Empathy Scale or BEES, Mehrabian & Epstein, 1972; The Questionnaire on
Affective and Cognitive Empathy or QCAE, Reiners et al., 2011). While some questionnaires disentangle cognitive and affective components of empathy (the EQ), others assess empathy as a multidimensional construct (the IRI captures dimensions such as perspective taking, empathic concern, personal distress, and fantasy). These questionnaires were more likely to be used in correlational studies, or in some cases in experimental studies to examine trait empathy as a moderator of the effects of alcohol intoxication on aggression (Giancola, 2003). However, self-report questionnaires are susceptible to socially desirable answers (Neumann et al., 2015) and they only measure trait empathy; therefore, vignettes, and computerized tasks were developed. Vignettes offer participants a written description of a story or a video with characters in a situation, and participants are asked to rate the character’s behavior (López-Martínez et al., 2023). Similarly, computer tasks offer participants videos or images as stimuli, and they are asked to use a dial or a keyboard in order to identify the target character’s feelings or behaviors (Zaki et al., 2009). Some other examples of tasks that assess cognitive forms of empathy or ToM include the Multifaceted Empathy Test (MET, Dziobek et al., 2008) and the Reading the Mind in the Eyes Test, Revised (RMET, Baron-Cohen et al., 2001). These two tasks used pictures as stimuli and perceivers were asked to identify the expressed feeling or mental state. However, a multimodal approach (e.g. including multiple empathy measures) in studying how alcohol affects social cognition might vastly contribute to our understanding of these processes and their outcomes.

As importantly, the participants in previous studies have differed. Correlational studies with a cross-sectional design tested young healthy adolescents and college students who engage in drinking behaviors (Blevins et al., 2017; Laghi et al., 2019). These types of young samples from cross sectional studies are relevant to observe early associations between trait-like empathy and drinking motives and alcohol use. Experimental studies that administered various alcohol doses also tested adult social drinkers, not diagnosed with an AUD (Dolder et al., 2017; Francis et al., 2019; Thiel et al., 2018). Adult social drinkers, not diagnosed with AUD, are most suitable when studying acute alcohol effects on state-like forms of social cognition because in this type of sample confounders like cognitive deterioration (likely to be present in AUD) are controlled for. Finally correlational case-control studies administered questionnaires in a clinical setting to participants diagnosed by a clinician and receiving treatment for an AUD (reviewed in Kumar et al., 2022),
helping researchers to better understand the impact of long-term alcohol use by comparing clinically diagnosed people with an AUD with similar comparison groups without AUD.

This thesis

Empathy is considered an important component in social cognition that contributes to appropriate social functioning. Bearing in mind that problematic patterns of alcohol consumption are often related to a decline in social functioning, identifying means to overcome these problems with alcohol consumption and problems in social functioning is pivotal. Given the widespread prevalence of alcoholism and, overall, that alcohol is the only dangerous substance that has been and remained socially accepted in various cultures, we can concede that problematic alcohol use has become part of our lives. Clinicians are an important part of the endeavor that targets the challenge of treating people that suffer from addiction and support the people involved with an addicted person. But on top of their effort, researchers are also driven to discover pertinent processes that help explain how alcohol becomes impairing to people’s daily functioning (Figure 1). In order to study the role of empathy in the alcohol-aggression relationship, I carried out three different studies that I will describe below and one last study that is ongoing (included in this thesis as a pre-registered protocol).

The purpose of the chapter two was to get an up-to-date comprehensive overview (based on experimental studies) of the available findings regarding the impact of alcohol use on social cognition and to examine the state of the art regarding procedures, methods, and results. Thus, chapter two of this thesis will present a systematic review on experimental studies that measured alcohol effects on various social cognition variables. In this chapter, I analyzed studies that measured emotion recognition, ToM, different aspects of empathy, and information processing of cues related to inappropriate sexual behavior after an acute alcohol dose administration.

The hypothesis that empathic deficits might exist a priori in individuals at risk for AUD is supported by studies in adolescents and young drinkers (Blevins et al., 2017; Laghi et al., 2019), who often find themselves in the context of alcohol use because of peer pressure (wanting to conform) or because of poor emotional
support (wanting to cope with negative feelings). There are studies that linked the coping motive with more drinking in order to deal with problematic outcomes in heavy drinking (Goldstein et al., 2009; Ham et al., 2003; Blevins et al., 2018), in both younger adolescent drinkers (Willem et al., 2012) and older adult drinkers (Simons et al., 2017). Why people drink can provide an overall picture of their emotional state, as some studies already found that young people who turn to drinking in order to cope have poor emotion regulation (Aurora et al., 2016; Simmons et al., 2017) and higher negative affect (Veilleux et al., 2014). In chapter three, I present an online study in people that report a wide range of drinking habits and tested whether their drinking motives (negative or positive) might moderate how their drinking is associated with different facets of empathy (cognitive, affective, and behavioral). The most novel feature of this study is that drinking motives were not examined before as moderators of the alcohol and empathy association, thereby I could reflect on the implications regarding a priori emotional state that might lead to problematic alcohol use.

In chapter four, I aimed to replicate the findings of a previous study on alcohol and empathic accuracy cited earlier in this chapter (Thiel et al., 2018), and also to extend and improve the design by measuring both empathic accuracy and behavioral empathy before and after alcohol administration. Following the methodological considerations and observations made in chapter two, in chapter four I employed an experimental design in individuals without AUD to test whether drinking a moderate dose of beer affects empathic accuracy and empathic behavior. This way, I was able to also look at within person changes, not only at between person differences after alcohol vs placebo. Also, in this study I used the various types of measures discussed above which made it possible to test alcohol-induced changes in empathy (assessing empathic accuracy by using a computer task and behavioral empathy by using vignettes) and to look at the moderating effect of empathy as a trait (by using a questionnaire).

The last study described as a pre-registered protocol in the chapter five is a case control study that compares individuals diagnosed with AUD with healthy controls on all three forms of empathy discussed, and aggressivity in order to verify whether empathy is a mediator in the alcohol-aggression model. This study is still ongoing at the time of this thesis submission, and the data is collected from
Romanian AUD patients and a comparison group without AUD. Additionally, I will resume the progress of this study.

Finally, in **chapter six**, I summarize and discuss the findings through all studies and place them into the existing theoretical framework. Moreover, I discuss the limitations and possible clinical implications as well as directions for future research.