Some psychological and social factors in relapse after long-term abstinence in substance use disorder

by

Fredrik D. Moe

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University of Stavanger
NO-4036 Stavanger
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Abstract

Background

Knowledge about psychological and social factors in SUD recovery is scarce. There is even less comprehension of the factors associated with relapse for people in long-term recovery.

Objective

The objective of this thesis has been to investigate psychological and social factors associated with relapse after long-term abstinence. Specifically, it investigates psychological functioning and recovery over five years, and drug-free friendships and alcohol and substance use trajectories over four years. However, to achieve this aim, it was necessary to conduct a systematic review of relapse operationalisations after short-term and long-term abstinence, and remission, recovery, slip and lapse. This review provided a foundation for investigating relapse after long-term abstinence, as a better overview of previous research made it possible to operationalise the relapse concept in accordance with prior research.

Method and hypotheses

The systematic review was conducted following the PRISMA guidelines and publishing a PROSPERO protocol. Next, two quantitative analyses were conducted using statistical modelling. These studies are based on the Stayer study (n = 208) that contains measures on psychological and social factors collected annually across five years. We postulated that improvement in psychological functioning would increase the chance of recovery and reduce the risk of relapse across five years. In the third study, we hypothesised that having drug-free friendships would reduce alcohol and substance use levels. Furthermore, we postulated that debut

age and gender were associated with alcohol and substance use trajectories across four years.

Results

In the systematic review (paper I), we found that there was neither consensus on relapse operationalisations nor differentiation between early and late relapse. We found that there were significantly more short-term than long-term studies.

In paper II, we found that improvement in psychological functioning aids recovery across five years. However, we found an annual decline in recovery scores, indicating that improvement in psychological functioning may be important to obtain recovery, but not sufficient to maintain it.

In paper III, we found that alcohol and substance use trajectories were mostly stable across four years, i.e. from first to fifth follow-up. We found that neither having drug-free friendships nor gender and debut age seemed to influence alcohol and substance use trajectories across four years.

Conclusions

In our review, we conclude that there is less knowledge about relapse after long-term abstinence, i.e. relapses happening after two years of recovery. The SUD research field appears not to differentiate between early and late relapse. Moreover, there are variations in the operationalisations of relapse, as they seem to differ in degrees of detail when representing relapse. Operationalisations of remission and recovery appear to favour abstinence over other functional measures, which is contrary to the recovery literature. Relapse seems to be regarded as a static phenomenon rather than dynamic and as an endpoint and not a change point. The variation in relapse operationalisations may make it difficult to aggregate study results and build on previous research. The

knowledge base on relapse prevention after two years of recovery is scarce, which may lead to suboptimal long-term treatment.

In paper II, we conclude that improvement in psychological functioning is important for obtaining recovery, but insufficient to maintain recovery consistently across five years. Hence, there is a need for other improvements in personal and social functioning to increase the chance of obtaining and maintaining recovery.

In paper III, we discuss discrepancies between our results and previous research. Contrary to previous research, drug-free relationships were found to have little influence on reducing alcohol and drug use, while debut age and gender were unrelated to use trajectories. We conclude that research and theory on social determinants and social recovery indicate that there exists such a relationship and that there are good reasons to believe that positive support from others and a positive environment aid recovery. Consequently, our findings warrant more research.

Abbreviations

SUD = Substance Use Disorder

Stayer = Norwegian Stavanger Study of Trajectories in Addiction

RC = Recovery Capital

SDMH – Social Determinants of Mental Health

OD = Open Dialogue

PROSPERO = International Prospective Register of Systematic Reviews

PRISMA-P = Preferred Reporting Items for Systematic reviews and Meta-Analysis for Protocols

DUD = Moderate–Severe Drug Use Disorder

AUD = Alcohol Use Disorder

AA = Alcoholic Anonymous

SBNT = Social Behaviour and Network Therapy

CRA = Community Reinforcement Approach

SST = Social Support Theory

SCL-90-R = Symptom Checklist 90 Revised

MMPI = Minnesota Multiphasic Personality Inventory

DSM-5 = Diagnostic and Statistical Manual of Mental Disorders – version 5

DSM-IV = Diagnostic and Statistical Manual of Mental Disorders – version IV

ICD-10 = ICD-10 Classification of Mental and Behavioural Disorders

PSUD = Polysubstance Use Disorder

SWLS = Satisfaction with Life Scale

SABRS = Strengths and Barriers Recovery Scale

SEM = Structural Equation Modelling

LGM = Latent Growth Curve Analysis

LCA = Latent Class Analysis

CrediT = Contributor Roles Taxonomy

KORFOR = Alcohol and Drug Research Western Norway

REK = Regional Committees for Medical and Health Research Ethics

NESH = National Committee for Research Ethics in the Social Sciences and the Humanities

GDPR = General Data Protection Regulation

SMS = Short Messaging Service

BRIEF-A = Behavioral Rating Inventory of Executive Function – Adult Version

AUDIT = Alcohol Identification Disorder Test

DUDIT = Drug Use Disorder Identification Test

RMSEA = Root Mean Square Error of Approximation

CFI = Comparative Fit Index

SDH = Social Determinants of Health

KVARUS/NQR-SAT = National Quality Register for Substance Abuse Treatment

BR-index = The Behavioral Regulations Index

MI = Metacognition Index

GEC = Global Executive Composite

PROM-data = Patient-Reported Outcomes Measures

PREM-data = Patient-Reported Experience Measures

df = Degrees of Freedom

WLSMV = Weighted Least Square Mean and Variance adjusted

M1 = Model 1

M2 = Model 2

M3 = Model 3

EU = European Union

FAB = Frelsesarmeens Behandlingssenter

Table of Contents

1 Introduction

In order to improve the course and outcome in the treatment of substance use disorder (SUD), service users, their families, and their support system need valid and applicable evidence-based knowledge of mechanisms and mediators for reducing relapse after long-term abstinence. Relapse in SUD is common. Empirical findings indicating high-frequent relapse in SUD (McKay & Hiller-Sturmhofel, 2011) have led some researchers to classify (serious) SUD as a chronic illness (McLellan, Lewis, O'brien, & Kleber, 2000; Scott, Dennis, Laudet, Funk, & Simeone, 2011). However, there is no consensus on the definition of relapse. There is great variation in the literature when it comes to the number of years and degree of substance reduction used to define relapse (see e.g. Calabria et al., 2010; Fleury et al., 2016; Jin, Rourke, Patterson, Taylor, & Grant, 1998; Maddux & Desmond, 1986; Maisto, Hallgren, Roos, & Witkiewitz, 2018; Moos & Moos, 2006; Witkiewitz et al., 2019; Xie, Drake, McHugo, Xie, & Mohandas, 2010). Furthermore, there are few research studies extending two years on social and personal functioning in SUD (Bjornestad, McKay, Berg, Moltu, & Nesvåg, 2020; Tiffany, Friedman, Greenfield, Hasin, & Jackson, 2012), and most treatment models are based on acute care (Dennis & Scott, 2007). Thus, knowledge about factors facilitating SUD recovery is scarce, and long-term treatment perspectives seem few. Since most studies measure short-term treatment outcomes, it is difficult to reliably infer why people relapse after several years of abstinence. This has implications for our knowledge about SUD recovery. Recovery is a long-term, protracted, dynamic, multidimensional change process in various life domains and substance use (Vanderplasschen & Best, 2021). Presumably, then, SUD research should address long-term change processes in multiple life domains involving substance use reduction. However, the scarcity of knowledge about such recovery processes, may have plausibly resulted in an incomplete assessment of treatment needs and, thus, suboptimal treatment (McKay, 2017; McLellan, McKay, Forman, Cacciola, & Kemp, 1995; Tiffany, Friedman, Greenfield, Hasin, & Jackson, 2012).

The purpose of this thesis is to address these shortcomings by contributing with a) a systematic review of relapse operationalisations after short-term and long-term abstinence, remission, recovery, and slip/lapse; b) a statistical analysis of the predicting role of psychological functioning in remission and recovery across five years; and c) a statistical analysis of the association between having drug-free friends and alcohol and drug use, as well as how debut age and gender influence alcohol and drug use four years after treatment.

2 Background

On a global scale, one percent of deaths are attributable to substance use (Thompson et al., 2020). Mental and substance use disorders affected more than one billion people worldwide in 2016, accounting for seven percent of the total global disease burden (Rehm & Shield, 2019). After one year of treatment, almost 2/3 of SUD patients relapse (Thompson et al., 2020), and the risk of relapse looms even after four to five years of continued abstinence (White, 2007). Thus, knowledge about factors associated with relapse after short-term and long-term abstinence is essential to increase rates of lasting SUD recovery.

2.1 Substance use disorder

SUD is classified as a mental disorder involving dependence on a particular substance or substances, such as alcohol, opiate, or stimulants (American Psychiatric Association, 2013). In the Diagnostic and Statistical Manual of Mental Disorders – version 5 (DSM-5), the diagnostic assessment states that one must fulfil at least two out of 11 diagnostic criteria in the past 12 months to qualify for a SUD, such as control-loss (criteria 1 and 2), tolerance (criteria 10), withdrawal (criteria 11), or social adversaries (criteria 5-7). Depending on the number of diagnostic criteria a person fulfils, the SUD is classified as either mild, moderate, or severe. In the ICD-10 Classification of Mental and Behavioural Disorders (ICD-10), SUD is categorised as either harmful or dependent. One must fulfil three or more of six diagnostic categories within the preceding year in order to qualify for a dependence diagnosis (World Health Organization, 1993). SUD is often defined as a chronic illness (Scott et al., 2011) involving a repeating cycle of abstinence and relapse (McKay & Hiller-Sturmhöfel, 2011).

2.2 Theories of addiction and research findings

This section outlines some psychological and social theories of addiction and related research. This literature provides an explanatory outline of how some SUD patients develop dependence and what may increase relapse risk.

2.2.1 Psychological theories and research findings

There are different psychological theories for explaining why people with SUD relapse even after a long period of abstinence (Moe, 2020). According to West and Brown (2013), SUD can result from difficulties with self-regulation, mentalisation, classical or operant conditioning, changes in brain networks, or maladapted cost-benefit analysis.

2.2.1.1 Self-regulation theory

Self-regulation theory states that actions (e.g. late relapse) occur from multiple processes in competition with each other. Self-regulation involves higher processes overriding lower processes (West & Brown, 2013). Thus, late relapse as a lower process may override remission (higher process) when the person experiences lack of self-control and low self-consciousness. For example, sleep deprivation may lead to mental and physical fatigue affecting self-control and self-consciousness, decreasing the person's ability to self-regulate and refrain/abstain from substance use. Such a perspective is close to mentalisation-based SUD treatment (Arefjord, Morken, & Lossius, 2019). Mentalisation is defined as the ability to understand the mental state of oneself and others that underlies overt behaviour (Karterud, 2011). Poor mentalisation leads to lower self-regulation, which can contribute to the development of substance use disorder (Savov & Atanassov, 2012). One possibility is that moments of lower mentalisation capacity may jeopardise abstinence maintenance in long-term recovery, leading to a late relapse.

2.2.1.2 Behavioural psychology

Classic and operant conditioning are learning theories focusing on how cues generate impulses to engage in behaviour (e.g. late relapse). Late relapse may occur when environmental cues trigger a craving for substance use based in earlier repeated pairings of environmental stimuli with the drug effect (West & Brown, 2013). According to operant conditioning (instrumental learning), SUD may develop due to rewarding behaviour from substance use, which operates outside of conscious awareness. This is known as positive reinforcement. When the individual experiences withdrawal symptoms, this functions as a negative reinforcement to continue with substance use (to escape withdrawal symptoms) (West & Brown, 2013).

2.2.1.3 Biological psychology

The dopamine theory of drug reward argues that SUD results from the drug's effect on dopamine receptors in the nucleus accumbens in the brain (Mørland & Waal, 2016). The substance influences our natural reward system and how we perceive the drug's importance. The rewarding effect of taking the drug may increase the chances of developing SUD. The theory's relationship to late relapse may be unclear as one presumes that neuroadaptation or habituation (the central nervous system seeking equilibrium) will re-calibrate the dopamine receptors back to normal when abstinent (Mørland, 2017). Such neuroadaptation stops cravings for the drug at a neuronal level. If the receptors are destroyed, however, late relapse may be caused by a need for the drug to attain adequate dopamine levels (Kuhar, Unnerstall, & De Souza, 1985).

2.2.1.4 Personality psychology

Rational choice theory claims that SUD develops from a "rational" choice that favours the benefits of substance use over its costs (West & Brown, 2013). In this thinking, late relapse results from analysing the benefits and costs of re-initiating substance use. A Lacanian theory of

addiction states that the object (drug of choice) is supposed to satisfy the subject's drive circuit, meaning that the object is not the sole cause of the addictive behaviour (Laurita, 2018). Object relation theory (Scharff, 1996) suggests that addictive behaviours function as a substitute for a parental figure based on early childhood experiences. Psychoanalytic theories highlight how SUD and relapse may be a tool to facilitate attachment and social contact with others.

2.2.1.5 Research: the individual and relapse

Research indicates that particular personality traits, such as scoring low in conscientiousness and high on neuroticism, are associated with SUD (Terracciano, Löckenhoff, Crum, Bienvenu, & Costa, 2008). This indicates that being sloppy, impersistent, anxious, and hostile are associated with relapse. Jin et al. (1998) found that late relapse (relapse after 18 months of abstinence) was associated with psychological trait problems. They found an association between late relapse and elevated scores on the Minnesota Multiphasic Personality Inventory (MMPI) Scale 4 measuring psychopathic traits.

Mental disorders and depressive emotions have been associated with early relapse, that is, relapse within the first year of abstinence (Cornelius et al., 2003; Domino et al., 2005; Nordfjærn, 2011) and low internal motivation (Andersson, Wenaas, & Nordfjærn, 2019). Furthermore, SUD patients who scored higher on somatization, hostility, and paranoid ideation on the Symptom Checklist 90 Revised (SCL-90-R) have been found to relapse within the first year of abstinence compared to SUD patients scoring lower on all SCL-90-R items (Hagen, 2018). Research indicates that late relapse is associated with low self-efficacy, avoidant coping style, and not considering problematic substance use as a problem (Moos & Moos, 2006). One explanation is that low mentalisation capacity may lead to low self-efficacy and increase the probability of late relapse. However, studies deploy different abstinence time criteria for what constitutes early and late relapse. Different definitions of early and

late relapse may indicate dissensus about relapse boundaries (Moe, Moltu, McKay, Nesvaag, & Bjornestad, 2021). It seems that adequate psychological functioning or health may be necessary to refrain from substance use.

Intrapsychic theories often presume, either implicitly or explicitly, that they encompass most of the explained variance. In this respect, they may be criticised for not paying enough attention to aspects beyond their core constructs or contextual aspects, and hence, they may overlook a complex understanding of the multitude of cause-and-effect relationships behind human behaviour. Clearly, an understanding of individuals' relapse and recovery only by individual or intrapsychic factors would be insufficient, as these processes do not occur in a social, societal or relational vacuum.

2.2.2 Social psychological theories and research findings

Social theories of addiction focus on how the individual is embedded in social relationships and how this influences behaviour such as substance use, relapse, or recovery.

2.2.2.1 Social learning theory

Social learning theory states that we learn new behaviours by observing and imitating others (Myers & Smith, 2012). Bandura (1978) claimed that, although inner motives are relevant, a person's behaviour depends largely on the social context. In this respect, a person's self-efficacy, that is, belief in oneself to produce desired effects based on their actions (Bandura, 1999), is influenced by the environment. Self-efficacy is claimed to be the core of the human agency. Furthermore, self-efficacy interacts within a broad network of sociocultural networks (Bandura, 1999).

2.2.2.2 Social support theory

Social support theory (SST) focuses on the positive association between social support and well-being (Cohen & Wills, 1985). SST argues that social support protects people and provides a resource to handle stressful events, e.g. exposure to substances when abstinent. In this context, SST argues that having social support and using that support creates a buffer against relapse.

2.2.2.3 The Community Reinforcement Approach

The Community Reinforcement Approach (CRA) (Meyers, Roozen, & Smith, 2011) uses operant conditioning principles to rearrange the lifestyle of people with addiction, making a drug-free lifestyle rewarding or at least competing with the lifestyle of drug-taking. CRA focuses on gradually involving people with addiction in pleasant social activities and increasing the enjoyment of community activities, such as work (Meyers et al., 2011).

2.2.2.4 Social Behaviour and Network Therapy

Social Behaviour and Network Therapy (SBNT) (Copello, Williamson, Orford, & Day, 2006) regards social network support as the hallmark of remission and recovery maintenance. SBNT aims to enhance the contact between the SUD patient and family and friends in order to mobilise and develop social network support for changing SUD behaviour. A common feature of all the social theories is that they favour social relations as the factor improving SUD.

2.2.2.5 Research: the social context and relapse

People with SUD have sustained abstinence for more extended periods if they have social support, such as Alcoholic Anonymous meetings (AA) (Nesvåg & McKay, 2018) and recovery-oriented social networks, including an explicit focus on employment and contact with friends and

family (Hendershot, Witkiewitz, George, & Marlatt, 2011; Weisner, Ray, Mertens, Satre, & Moore, 2003; Aakerholt & Nesvåg, 2012). Furthermore, positive change in social contact has been associated with increased quality of life and possibly decreased substance use (Muller, Skurtveit, & Clausen, 2019; Vigdal, Moltu, Bjornestad, & Selseng, 2022).

2.2.2.6 Social and recovery capital

Social support may be related to increased social capital (Bourdieu, 1977; Davidson et al., 2010). Social capital refers to the social investments an individual can make for herself and others, including trust, emotional support, integration, identity, social interaction, reciprocity, and community (Maddux, 2017). Presumably, social capital is essential to people with SUD as recovery involves reintegration into the community and establishing a new identity, new social networks, and trustful relationships with others. In addition to social capital, Bourdieu distinguishes between economic and cultural capital (Aanesen, 2021). Economic capital refers to an individual's economic resources, while cultural capital is the cultural characteristics and skills that provide access to work, education, and prestigious social networks. The concept of social capital is related to recovery capital (RC) in SUD research (Hennessy, 2017).

RC refers to personal, social, and community dimensions where each dimension comprises assets aiding an individual's recovery (Best & Hennessy, 2021). These dimensions are interrelated and may influence the capacity for social adjustment, which may reduce the chances of late relapse. Poor social adjustment is related to substance use (Hagen, 2018), and SUD patients who do not relapse have sufficient social support (Nesvåg & McKay, 2018). Studies on short-term relapse indicated particular risk factors such as unemployment and lack of social support (Nordfjærn, 2011), while protective factors included social support and 12-step affiliation (Laudet & White, 2008). In this context, it is suggested

that social support acts as a buffer against stress which again protects the individual against relapse (Laudet, Morgen, & White, 2006).

Interpersonal theories often presume, either implicitly or explicitly, that the social context accounts for most of the observed behaviour. For example, Durkheim's theory of suicide has been criticized for giving too much explanatory weight to societal aspect when explaining individual behaviour (Mueller, Abrutyn, Pescosolido, & Diefendorf, 2021). There is also the risk of considering the observed behaviour to mainly be a result of the treatment intervention (Kverme, Natvik, Veseth, & Moltu, 2019) or to study it primarily through a particular construct; social network theory states that interpersonal bonds are information-carrying connections between people. Evidently, the individual may have their own reasons or feelings or idiosyncrasies to why they relapsed or are in recovery that may not be wholly explained by the person's social and material context.

2.2.3 "Micro" and "macro" explanations of recovery and relapse

When seeking to understand complex aspects of human behaviour such as relapse and recovery, intra- and interpersonal explanations should supplement one another. It is, however, not possible to conduct a comprehensive and exhaustive study of such a complex phenomenon within the scope of one PhD-thesis. I have investigated changes in participants' characteristics and their relationships which are claimed to be associated with recovery from a professional-led perspective. This may give insight into which individual characteristics are particularly important for obtaining and maintaining recovery from SUD on a group-level. Such research may provide important insights for clinical practitioners tailoring care. My choice of studying relapse and recovery in these ways influence my position as a researcher. I approach my research object from a "quantitative gaze" that does not take the

participants' view into account. In other words, I investigate recovery from a researcher-defined perspective with objectified outcomes which exclude the first-person perspective. Community aspects could arguably have been taken more into consideration. In chapters four and five, I will elaborate on how my choice is connected to the clinical recovery tradition.

3 Relapse after long-term abstinence

3.2 The relapse concept's relation to remission and recovery

'Relapse' refers to a return to a previous level of substance use after a period of considerable reduction or abstinence from substance use. Miller (1996) argues that the dichotomous classification of abstinence and relapse is too simple for such complex phenomena. He shows that the definition of the 'relapse' concept is elusive and does not adequately reflect how behaviour change occurs in SUD. For example, research shows that recovery and remission include periods of abstinence with gradual reduction of substance use along with improvement in other psychosocial areas (Miller, 1996; Witkiewitz et al., 2019) in cases where periods of substance use and abstinence are common (for some people but not all). Thus, a binary dichotomy between abstinence and relapse does not capture that recovery is an ongoing dynamic behaviour change process including diverse pathways to obtain and maintain recovery (Witkiewitz, Montes, Schwebel, & Tucker, 2020). In this regard, Miller (1996) shows how the 'relapse' concept is related to recovery and remission, and in turn, that they are dynamic rather than static phenomena. Likewise, a *standard* definition of relapse might be challenging to pinpoint, and thus specific definitions might be more helpful. For example, a relapse might differ depending on the type of substance use, demographic group, and context. Additionally, a binary definition of relapse may leave out the subtle difference between a relapse and a slip or lapse, i.e. a minor setback not as severe as a relapse.

Moreover, research on relapse, remission, and recovery, both in SUD and in related fields, demonstrates that there is a plausible difference in causal factors between relapse after short-term abstinence (hereafter: early relapse) and long-term abstinence (hereafter: late relapse). In the long term, positive changes in functioning, including social and

professional functioning, as well as a sense of community belonging and identity change, are more protracted processes than symptomatic relief or symptomatic remission (Bjornestad et al., 2020; Davidson et al., 2007a; Leamy, Bird, Le Boutillier, Williams, & Slade, 2011; Price-Robertson, Obradovic, & Morgan, 2017). Martinelli et al. (2020) found that recovery is a gradual, long-term process that includes distinct phases involving various life domains beyond abstinence. Such results indicate that recovery is an ongoing dynamic process of behavioural change (Witkiewitz et al., 2020). Individuals in long-term recovery typically have fewer problems related to housing, criminality, and substance use and are more likely to be employed or attend education than individuals early in recovery (Martinelli et al., 2020). Thus, late relapse plausibly involves other challenges in social behaviours and functioning compared to early relapse. Furthermore, studies on first-year abstinence suggest that cognitive functioning and learning ability are significantly reduced during the first year of abstinence, likely making these factors more prominent in early relapse (Ersche et al., 2005; Hagen et al., 2017). Moreover, the early physical demands induced by symptoms of withdrawal (Li, Caprioli, & Marchant, 2015) and the need for change in nutrition and physical exercise are more prominent in early relapse (Brady, Gray, & Tolliver, 2011). Thus, early relapse will plausibly involve reduced cognitive and physical capacity. In sum, these findings indicate that early and late relapse are related to different life domains, and hence that they are different phenomena.

Based on the discussion above, late relapse may differ from early relapse. SUD research also seems to substantiate such distinction. Early relapse seems to be associated with depressive emotions, mental illness, unemployment, and lack of social support (Cornelius et al., 2003; Domino et al., 2005; Nordfjærn, 2011). Late relapse appears to be associated with the use of avoidant coping style, low self-efficacy, and not considering problematic substance use as a problem (Moos & Moos, 2006). However, there seems to be no consensus on operationalisations

of 'early and 'late' relapse nor on the application of time criteria. For early relapse, some studies used 2–6 months (Cornelius et al., 2003), while others used 3–12 months (Nordfjærn, 2011). For late relapse, some studies used 18 months (Jin et al., 1998), while others used three years (Moos & Moos, 2006). Thus, the existing literature makes it difficult to establish whether a relapse is, in fact, early or late. This thesis distinguishes late relapse by operating with a five-year time scope.

3.3 The clinical utility of the relapse concept

Previous research (Maisto, Witkiewitz, Moskal, & Wilson, 2016) suggests that the concept of relapse in AUD has low heuristic value, i.e. that it is poorly equipped to advance clinical research and practice. Hence, it is uncertain if current relapse operationalisations have clinical utility, which touches upon the translation of results from SUD research into SUD practice. According to Maisto et al. (2016), the clinical utility of the relapse concept was low because it is operationalised differently in different studies and is not based in theory. This makes it challenging for SUD research to advance clinical knowledge because it is cumbersome to build on results across research.

A suggested solution to this problem is to define relapse as an absence of abstinence (Sliedrecht, de Waart, Witkiewitz, & Roozen, 2019). However, a too narrow or too broad definition of relapse may hide phase-specific needs and challenges during the course of recovery and thus make it more difficult to implement well-timed and tailored treatment efforts. Furthermore, without a coherent operationalisation of the relapse concept, there will be a risk that the phenomenon is inadequately represented, making it difficult to compare study results and implement relapse prevention. This resonates with what Hagger (2014) denotes as the 'déjà-variable' phenomenon and the 'jingle' fallacy. Taken together, they refer to the presumption that the same construct has similar meaning across studies when, in fact, different terminology has been applied to the same construct. This might lead reviewers to conclude that findings

of relapse are inconsistent when, in fact, the inconsistency is due to differences in terminology.

One possible solution to the problem of translating SUD research findings into SUD practice and increasing clinical utility may be to include functional and recovery measures when studying relapse. This may be possible if we view relapse as a process rather than as an endpoint (Chung & Maisto, 2006; Maisto et al., 2016), i.e. as a process of behaviour change rather than an outcome. In this perspective, relapse is seen as a setback to a problematic pattern of use rather than any return to use. If SUD research views 'relapse' as a problematic pattern of use, it might be easier to include other features pertinent to the setback. At least it will perceive 'relapse' as a dynamic rather than static process.

These challenges correspond to the conceptual issues that led schizophrenia research to expand its outcome measures. The field received criticism for relying too much on symptom scales as a measure of efficacy when, in fact, it had low effectiveness, i.e. the translation of results from randomized clinical trials into clinical practice was poor (Friesen, 2019). Additionally, there was increasing awareness of the difference between factors considered by symptom scales and the factors thought of as essential for those diagnosed with schizophrenia. The latter has been seen as promoted by the recovery movement and their demand to include more meaningful outcomes in research (Friesen, 2019). These criticisms lead to the development of recovery measures focusing on personal, professional, and social functioning, such as work, school, hope, and relationships, rather than symptom scales which focus on, e.g. the presence of hallucination.

4 Research focus: Recovery and psychological and social functioning

This thesis investigates whether improvement in psychological functioning aids clinical recovery and whether drug-free friendships influence alcohol and drug use and recovery across five years. I postulate that this will be related to late relapse risk. In this section, I will elaborate on this choice of focus.

4.2 Recovery

Recovery is a protracted, heterogeneous, multidimensional process (Witkiewitz et al., 2020). It is common to separate recovery into clinical, personal, and relational recovery. A conceptual difference is often explained by demarcating between *recovery in* and *recovery from* a health problem. *Recovery in* falls within personal and relational recovery frameworks. From this perspective, substance misuse (or mental health) suffering is understood as experiences that constitute challenges for the person trying to live well, and health is understood as finding meaningful ways of living with, rather than getting rid of, these experiences (Davidson, 2016; Davidson & Roe, 2007). *Recovery from* falls within a clinical recovery framework where substance misuse suffering is understood within a medical meta-model. Here, the focus is on alleviating symptoms and helping the individual to return to a healthy state after the onset of illness. There is a tendency in the *recovery from* perspective not to problematise illness or disease conceptualisation. Such problematisation seems to be more prominent in *recovery in*.

Clinical recovery refers to SUD as a distinct disorder containing specific core symptoms. The symptoms are based on researcher-derived thresholds, predefined objectives, and time criteria to decide stable recovery (Bjornestad et al., 2020). It focuses on *recovery from* SUD. The traditional view of clinical recovery seems to be too narrow and have too short temporal criteria. Often it appears to conflate recovery with abstinence (see paper I).

Within a personal recovery framework, recovery is treated as an individualised process that goes beyond reducing symptoms, focusing on personal identity change, community belonging, and the ability to build a life even though one's condition may impose limitations (Davidson et al., 2007b). Five long-term processes recognise personal recovery: identity, hope and optimism, connectedness, empowerment, and meaning in life (Leamy et al., 2011). Relational recovery is a critique of clinical and personal recovery based on the claim that these frameworks are too focused on recovery as an individualised process and thus fail to capture the interpersonal embeddedness and social contexts of recovery (Price-Robertson et al., 2017). Personal and relational recovery frameworks fall within *recovery in*. These frameworks seem to have challenges with a consistent conceptualisation of recovery. One possible weakness is that the five long-term processes mentioned by Leamy et al. (2011) are based on samples with vague recovery criteria, such as "defined themselves to be in recovery" or "not hospitalized during the last 12 months". It is challenging to assess what these criteria reflect and, thus, how the research results may apply to others in recovery. Concerning the relational recovery framework, what may be challenging is how to include recovery's intersubjectivity when conducting quantitative research. For instance, a person's well-being or identity may be inconceivable outside a social and material context, but this context may be difficult to implement when creating variables or conducting statistical analysis. Given these reflections, and this project's aim to contribute to improved measurable operationalisations, I considered the clinical recovery framework as a constructive foundation to depart from. Research on clinical recovery may progress clinical practice. However, the clinical recovery tradition needs to discuss how it constructs disease, which may result from how psychiatry conceptualises psychopathology (Moe & de Cuzzani, 2022).

Although the three recovery definitions focus on different aspects, they all consider symptom reduction significant to obtaining and maintaining

recovery. A critical distinction between *recovery in* and *recovery from* is that *recovery in* focuses on both living well despite ongoing symptoms in addition to treating the condition (Davidson & Roe, 2007).

Clinical recovery includes a temporal criterion indicating stability in behavioural change. Although there is no clear consensus on the temporal criterion, a minimum duration of two years has been suggested (Liberman, Kopelowicz, Ventura, & Gutkind, 2002). Presumably, after two years of stable change, including a decrease in symptoms and an increase in functioning, change has begun to consolidate despite the experience of relapse or lapse (Liberman et al., 2002; Slade et al., 2012). However, temporal criteria range from three to five years (White, 2007). At least for serious addictions, addiction research suggests a temporal criterion of five years to be necessary to reflect the extensive changes in personal identity needed to manage a drug-free lifestyle (Chappel, 1993; el-Guebaly, 2012; White & Schulstad, 2009). In this context, there is a need for long-term SUD research on personal and social functioning, clarifying the extent to which they influence SUD patients' ability to attain and sustain clinical recovery.

The three recovery frameworks overlap to some degree but contain important distinctions. In chapter five, I will elaborate on why my position mostly falls within clinical recovery in this thesis. It has been demanding to settle on a particular position.

4.3 Psychological functioning

The above sections have discussed different psychological theories and research. This literature illustrates how inadequate psychological functioning may be related to SUD in various degrees. Psychological functioning is the individual's capacity to overcome everyday life obstacles, promote well-being and capacity to recover, and take part in and contribute to the community (Johannessen, Nordfjærn, & Geirdal, 2019; World Health Organization, 2014). Improvement in psychological functioning is associated with SUD recovery (Mericle, Cacciola, Carise,

& Miles, 2014; Polcin, Korcha, Gupta, Subbaraman, & Mericle, 2016). A recent systematic review suggested that decrease in psychological distress and increase in psychological functioning, among other psychosocial factors, were associated with better coping behaviour and RC after SUD inpatient treatment (Johannessen et al., 2019). However, the authors concluded that there was a lack of knowledge on the long-term effects of how these factors are associated with coping behaviour after SUD treatment.

Psychological functioning increases after treatment entry and continued abstinence maintenance (Andreas, Lauritzen, & Nordfjærn, 2015; Booth et al., 2010). Contrary, relapse to drug use predicted decreased psychological functioning at six and twelve months of follow-up (Grella & Shi, 2011). Similarly, Erga et al. (2020) found that poor psychological functioning is associated with drug use and relapse risk. Thus, poorer psychological functioning seems associated with relapse and *vice versa*.

4.4 Social functioning

In this thesis, social functioning is understood in a broad sense, including relational and community features. This perspective acknowledges humans as social and bodily beings living in a material and social world (Fjelland, 2020). Human psychology does not operate in a vacuum. Hence, it may be presumed that improvement in psychological functioning requires a nurturing environment, in social relationships and in the community in general. The American academic Theodore Roszak elucidates this relationship through a thought example: Imagine watching a psychiatrist at work who is gifted, hardworking, and caring. His waiting room is full of patients. The practice is going well. The patients struggle with all sorts of troubling symptoms: emotional disorders, suicidal depression, horrific nightmares, and paranoid thoughts of persecution, surveillance, and harm. The psychiatrist listens attentively to each case and does his best to heal them without much success. Alas, they seem to be getting worse. Now, Roszak asks us to take a step back and view the scene from a larger context. The

psychiatrist's office is in a building, and the building is in a place called Buchenwald. In this concentration camp, the patients are prisoners (Roszak, 2001). This example suggests that in order to understand how improvements in psychological functioning come about, it is necessary to include a broader perspective.

Research on social determinants of health (SDH), i.e. non-medical factors that affect health outcomes, illustrates this (World Health Organization, 2017). SDH refers to the conditions in which people are born, grow up, and live. SDH research shows that the lower the socioeconomic position, the worse the health (World Health Organization, 2017). In other words, illness and health follow a social gradient. Thus, increased well-being and psychological functioning rely on social and political structures. These structures form the conditions of everyday life.

There are similar social determinants of mental health (SDMH). A recent review of SDMH shows that positive family relationships, social support, community belonging, and trust in others are associated with mental health outcomes (Alegría, NeMoyer, Falgàs Bagué, Wang, & Alvarez, 2018). Additionally, perceived emotional support may protect against the development of mental disorders. Moreover, in Norway, there is an association between unemployment, having mental challenges or physical disabilities, and being unsatisfied with life (Statistisk sentralbyrå, 2020, 2021). Thus, the individual's life situation is related to their satisfaction with life. In this regard, it seems that a particular life situation, i.e. an individual's material, cultural, social, economic, and political context, influences satisfaction with life, mental health, and physical health. Why do these features matter for people in general and maybe in particular for people in recovery? One reason is that social circumstances may shape behaviour and influence the health of people with SUD (Galea & Vlahov, 2002), while another is that there is a relationship between increased vulnerability to substance use and exposure to toxic childhood environments (Amaro, Sanchez, Bautista, &

Cox, 2021). Thus, socially based stressors, both early and ongoing, seems to influence people's vulnerability to substance use.

Contributory citizenship and community belonging may provide an explanation to why structural aspects influence recovery. A citizen is a member of a political community and have particular rights and obligations, and citizenship is viewed as the relationship between the state and the individual (De La Paz, 2012). Rowe and Davidson (2016) discuss 'recovery citizenship' in relation to how an individual may be provided access to fundamental rights and obligations despite being ill, such as supported employment or housing. This type of support may contribute to a sense of duty or obligation to society and, thus, a sense of participation and inclusion in society. I would argue that employment may create a sense of duty to society, e.g. through paying taxes that contribute to welfare goods for all citizens, that may strengthen an individual's sense of citizenship. In Norway citizens have a right to unemployment benefit if they are unemployed, but they are obliged to find new employment. This exemplifies the reciprocal relationship between the state and the individual. However, there is also a need to experience belonging in society and be validated by others (Quinn, Bromage, & Rowe, 2020). This may be related to Prilleltensky's (2021) concept of *mattering*, i.e. people's experiences of feeling valued and adding value. In order to be a contributory citizen and experience a sense of belonging in the community, people need to experience 'mattering'. Di Martino and Prilleltensky (2020) showed that social capital and social justice in 28 European countries were related to national life satisfaction. Their finding emphasises that friends and family, social networks, trust, and participation in society (social capital), and equal access to welfare and participation in society, such as work, and health (social justice), are associated with life satisfaction. Adequate social capital and social justice seem essential in mattering. Prilleltensky (2020) underscores a balance between adding value to others, such as the community, work,

relationships, and oneself and experiencing being valued by others, such as the community.

Mattering appears essential to SUD recovery. A recent review suggests that social support facilitating healthy community belonging is essential to obtaining and maintaining SUD recovery (Vigdal et al., 2022). People in SUD recovery described how important it was for them to experience a sense of value to others and be valued in order to sustain recovery (Veseth et al., 2021). Moreover, personal, social, and community resources (RC) have been consistently shown to reduce the risk of relapse while promoting recovery (Vanderplasschen & Best, 2021).

A person might have limited capacity to enter into social arenas that would be helpful or supportive, but the issue might also be reversed. There may be structural limitations for persons who need it to access important social arenas, for example through stigma processes. Stigma might constitute a significant challenge for those in recovery. For instance, people in recovery who perceived themselves to be stigmatised had less RC and self-esteem compared to those who did not have this belief (Ashford, Brown, Canode, McDaniel, & Curtis, 2019). Such perceptions may hinder access to the social environment which, according to the relational recovery framework, is pivotal to recovery. Additionally, clinical and personal recovery frameworks suggest that social factors are essential to recovery. There is also the possibility that people who have not integrated stigma may be denied access to social arenas, i.e. it may be the case that stigma is not caused by something within the person but by structural discrimination such as denied access to employment because of criminal history (van Olphen, Eliason, Freudenberg, & Barnes, 2009).

4.5 Psychological and social predictors

SUD recovery criteria are operationalised in research in various ways (Best & Hennessy, 2021). Recovery criteria typically include stable

substance abstinence and adequate personal and social functioning such as housing, drug-free friends, attending work or school, and income (Moe et al., 2021; Svendsen et al., 2020), but may also include criminality, role functioning, global functioning, satisfaction with life, and mental health (Bjornestad et al., 2020; Witkiewitz et al., 2019). SUD recovery predictors are suggested to be meaning in life, social networks, 12-step affiliation, social support, spirituality, mental health, employment, coping style, and self-efficacy (Cornelius et al., 2003; Domino et al., 2005; Kelly, Stout, Greene, & Slaymaker, 2014; Laudet & White, 2008; Moos & Moos, 2006; Nordfjærn, 2011). However, there is a lack of longitudinal studies on SUD recovery extending two years of follow-up, and studies mainly focus on substance use reduction rather than functioning (Bjornestad et al., 2020; Tiffany et al., 2012).

Drug-free friendships are suggested as essential part of the recovery process (McKay, 2017; Vigdal et al., 2022). Supportive friendships in recovery networks, such as Alcoholics Anonymous or non-drug using social networks, are related to sustained abstinence (Best et al., 2016; Drake, O'Neal, & Wallach, 2008; Nesvåg & McKay, 2018; Weisner et al., 2003) and reduced relapse risk (Ness, Borg, & Davidson, 2014; Nordfjærn, 2011). Through social support, drug-free friendships facilitate sustained recovery (Lookatch, Wimberly, & McKay, 2019). Having supportive friendships is proposed as crucial to recovery (Vigdal et al., 2022), while it is indicated that having unsupportive drug-free friendships negatively affects recovery (Dennis, Foss, & Scott, 2007; Groh, Jason, & Keys, 2008). It is suggested that SUD patients in recovery spend more time with peers in recovery than those not in recovery, which is associated with reduced relapse risk (Ellis, Bernichon, Yu, Roberts, & Herrell, 2004; van Melick, McCartney, & Best, 2013). However, studies have found that some people in recovery keep in touch with peers who are still using illegal substances (Flaherty, Kurtz, White, & Larson, 2014; Gueta, Chen, & Ronel, 2021). Having friends who are addicted may compromise one’s recovery, i.e. increase the risk of relapse (Havassy,

Hall, & Wasserman, 1991). In general, research indicates that social support may be positive, negative, or mixed in promoting recovery (McCrady, 2004). Moreover, it seems that the quality of drug-free relationships trumps the size of the social networks and whether they support abstinence or substance reduction.

5 SUD Recovery

In this section I will address concerns in recovery conceptualisation and recovery research. In my discussion of SUD and recovery, I will focus on the interdependency between the individual and the social.

5.1 Recovery and recovery research

As mentioned above, few longitudinal studies focus on functional measures and substance reduction (Bjornestad et al., 2020). However, there are also few studies on mechanisms and mediators of recovery (Vanderplasschen & Best, 2021). Recovery mechanisms refer to active interventions such as treatment or mutual aid groups or changes in the persons' lives that facilitate recovery, while recovery mediators are fixed characteristics such as gender, social positions, or age (Vanderplasschen & Best, 2021). Additionally, as Best and Hennessy (2021) argue, there is an urgent need for conceptual and operational development of RC, i.e. of a clarification of how to conceptualise and measure recovery gains and assets. Topor, Boe, and Larsen (2022) discuss the 'psychiatrisation' of recovery. They argue that clinical and personal recovery frameworks disregard social recovery, i.e. the social and interpersonal context of individuals' recovery processes. 'Psychiatrisation' refers to psychiatry's position in society and to the complex relationship between people, society, and psychiatry, where psychiatric institutions, practices, and knowledge affect an increasing number of peoples' lives (Topor et al., 2022). In this context, RC may reduce 'psychiatrisation' as RC broadens our understanding of recovery.

Best and Hennessy (2021) state that there are two understandings of SUD recovery. One, promulgated by e.g. The Betty Ford Institute Consensus Panel (2007), claims that abstinence is a necessary part of recovery, while the other, represented by the UK Drug Policy Commission (2008) and White (2007), focuses on quality of life and life functioning. In paper II, the focus is on clinical recovery, which may be said to be too objectivist or based on researcher-derived criteria, I nonetheless consider

this framework as valuable when it includes functional measures. However, such a stance may lead to methodological individualism, i.e. focusing too much on effect of respectively inner qualities (psychological functioning) or external aspects (work or drug-free friendships) on the recovery process. Methodological individualism mainly focuses on individual explanations and may regard recovery as detached from social factors. This is exactly what the relational recovery framework criticises (Price-Robertson et al., 2017). This framework argues that recovery is inconceivable outside of social, material, and economic contexts, a framework which I endorse. This latter perspective is more in line with methodological collectivism.

It is also important to recognise that people may be in the process of recovery, while having ongoing symptoms (Friesen, 2019) and that people with addictions may function well even in the case of inebriety (Witkiewitz & Tucker, 2020; Witkiewitz et al., 2019). For instance, a recovery framework that mainly promotes abstinence is too narrow for patients in Methadone Maintenance Treatment as this treatment often focuses on harm reduction (Frank, 2019), which inevitably involves varying degrees of substance use. Lancaster, Duke, and Ritter (2015) have examined how British and Australian drug policy describe and represent recovery, suggesting that they frame drug users as either responsible individuals or as patients. The authors argue that this is infused by implicit neoliberal (Britain) and medical (Australia) discourse and include "morally-weighted" concepts such as individual responsibility or what it means to live a productive life. Thus, we should be aware of how recovery frameworks may not be all-encompassing and that they are likely to include taken for granted assumptions. This is not special to recovery research; all sciences rests on philosophical preconditions (Andersen, Anjum, & Rocca, 2019). In their everyday scientific inquiries, scientists are guided by what they perceive the world to be (ontology), what they think they can know about it (epistemology) and how they think science should be practised (normative). These

preconditions are normally implicit. When it comes to the psychiatrisation of recovery, it seems Topor et al. (2022) argue that clinical and personal recovery typically rests on a philosophical precondition of putting the individual in the foreground, and not paying enough attention to its social context, i.e. recovery as interpersonal and intrapersonal. However, this is a matter of degree, as clinical and personal recovery may include a social context (Price-Robertson et al., 2017; Slade, 2009).

5.1.2 "The lost social context"?

Although the psychiatrisation of recovery focuses on mental health (Topor et al., 2022), its critique appears equally pertinent to the SUD field as it has adopted mental health recovery frameworks, although with some modifications. Topor et al. (2022) extend the critique put forward by relational recovery frameworks by including how current recovery perspectives and research on recovery perpetuates a distinction between clinical and personal recovery through psychiatrisation. Topor et al. (2022) borrow the concept of 'psychiatrisation' from Beeker et al. (2021) who claim that psychiatry affects peoples' lives to a larger degree than before. Psychiatrisation is related to similar societal critiques of psychiatry and medicine through concepts such as medicalisation, pathologization, psychologisation, and individualisation (Brinkmann, 2016; Conrad, 1992; Madsen, 2018b; Whitaker, 2010). These concepts have in common the critical perspective that psychiatry has individualised mental disorders, or mental problems, pathologized normal behaviour, sought to understand human suffering mainly from a biomedical framework, and excluded the social environment. Beeker et al. (2021) have observed that psychiatry has increased its influence on several societal dimensions even though the prevalence of mental disorders has been stable. The same has been stated about psychiatric disorders in Norway; the prevalence has been stable while the reporting of mental trouble has increased (Madsen, 2018a). One possible reason

for the increased reporting of mental troubles is that a therapeutic or psychiatric discourse is dominating in Western society (Madsen, 2018a).

Topor et al. (2022) suggest that the individualisation and 'responsibilisation' in Western society through neo-liberal politics and de-psychiatrisation of the patient, amongst other things, have affected the understanding of recovery. Karadzhov (2021) claims that most of the personal recovery literature on mental health has disregarded the impact of diverse socio-structural inequalities in the recovery process. It should be mentioned that Karadzhov (2021) refers to qualitative addiction studies that consider socio-structural aspects such as homelessness to a larger degree compared to mental health studies. SUD studies that neglect the social context of SUD patients risk upholding an atomised view of recovery as a result primarily of individual factors. According to Topor et al. (2022), this view distanced itself from the social, contextual, and material aspects of an individual's recovery. This led to a focus on individual and medical solutions to their illnesses rather than socio-structural ones. In this regard, the Open Dialogue (OD) approach is promising. OD is a psychosocial approach to treating mental illness which is less 'psychiatrising' as it may limit the use of neuroleptics, reduce mental illness problems, and reduce the use of psychiatric services (von Peter et al., 2021). Additionally, it is possible to receive treatments not solely based on a bio-medical framework (Cooper, Mason, Calton, Richardson, & Moncrieff, 2021).

Adhering to this recovery framework implies that SUD treatment and research risk being too individualised and decontextualised and may thus disregard the social dimension of people. Consequently, the SUD field may neglect social determinants' role in recovery and how recovery is inconceivable without social context. Moreover, such disregard may influence the type of research methodology researchers choose and what they look for; it may favour narrative and hermeneutical qualitative research frameworks of recovery focusing on a personal journey and personal turning points (Bøe, Bertelsen, Larsen, & Topor, 2021). The

post-qualitative framework criticises narrative and hermeneutical methods, which presumes the possibility of attaining experiential knowledge but overlooks that subjective and phenomenological experience may not follow such narratives (Brinkmann, 2015, 2017). Furthermore, it seems to presume an interpretive and chronological order of recovery that could possibly lead to overlooking other aspects not conveyable into the dimension of meaning (Bøe et al., 2021), but that are still important to the recovery process. This has been coined as the *qualitative fallacy*, which occurs when researchers overlook aspects of human experience such as bodily and material sides of being human that may not be conveyed into narrative and hermeneutical meaning frameworks (Bøe, Larsen, & Topor, 2019). I consider both sides as important to understanding human living, and SUD patients experiences of their recovery process may give us valuable insights into the recovery phenomenon. Thus, it is not that hermeneutics and narrative frameworks are unimportant, but that they may neglect other ways of understanding people's recovery. In this thesis, however, the *quantitative fallacy* may be more relevant as two of the present studies use statistical modelling rather than qualitative methods. The quantitative fallacy refers to trusting our measures and models too much (Bøe et al., 2019). Although the post-qualitative critique is justifiable, it nevertheless appears challenging for researchers to investigate a given phenomenon without assuming prior theory, preconditions, and preconceptions (Fjelland, 1991; Popper, 2014). Scientific enquiry is necessarily theory-laden.

It is possible that the SUD field also uses a recovery conceptualisation that favours an individuals' attitude while overlooking individuals' life conditions. For example, Larsen, Friesinger, Strømland, and Topor (2021) found that people with service user experience within mental- and/or addiction services describe their recovery as assemblages where humans and their environment are interdependent and co-exist, thus, indicating that SUD recovery involves individual and environmental dimensions.

In the case of the qualitative fallacy, the study by Veseth et al. (2021) on how meaningful activities contribute to recovery may be seen as an example of combining a narrative and hermeneutical approach while at the same time acknowledging other dimensions than 'meaning'. These other dimensions, so-called *small things*, are micro-affirmations that positively affect recovery (Topor, Bøe, & Larsen, 2018). Micro-affirmations are small and prosaic gestures of compassion that confer dignity and shared humanity (Davidson, 2020; Topor et al., 2018; Veseth et al., 2021). Veseth et al. (2021) relate micro-affirmations to the act of engaging in meaningful activities, although they argue that the latter is probably not as involved as the former in restoring personhood. Nonetheless, the authors appear to conclude that meaningful activities play an essential role in providing social affirmation, which is pivotal to individuals' recovery, and seemingly, *small things* facilitate this. In this context, it seems that recovery is inconceivable outside of work or meaningful activities, or more specifically, outside the social web.

5.1.3 Recovery capital: the interrelationship between person, social and community

SUD research has sometimes used the term RC to measure recovery, consisting of three domains: personal, social, and community (Best, Vanderplasschen, & Nisic, 2020). Personal capital refers to inner qualities such as skills and capabilities, while social capital refers to the strength of the individual's association with positive social networks. Community capital indicates the availability and accessibility of resources such as housing or employment. RC generally represents all external and internal resources that individuals have access to and which support their recovery process. These three domains are interrelated but kept separate for practical purposes: recovery research reduces the recovery phenomenon into manageable parts in order to represent, observe, and study it. While reduction is a scientific necessity (Fjelland, 2002), a systematic review has shown that RC measurement reduces the process of recovery to the point where it may not pay adequate attention

to community aspects and particular populations (adolescents), which may result in inconsistent conceptualisation (Hennessy, 2017). Furthermore, research on RC is limited.

In the context of this thesis, RC may refer to key social and personal resources that people can access to overcome substance misuse (Cloud & Granfield, 2008). For example, Laudet and White (2008) operationalised RC as spirituality, social support, meaning in life, 12-step affiliation and religiousness. However, such operationalisations may risk overlooking the community aspect. Community capital may be e.g. living in surroundings where stigma about addiction is actively lowered or where easy access to recovery mutual aid resources is in place (White & Cloud, 2008). Taking a conceptual perspective, Cloud and Granfield (2008) propose that RC exists on a continuum, i.e. from negative to positive capital. In this respect, it is possible to pinpoint barriers and aids to recovery. The examples of community capital mentioned previously would be viewed as positive, while living in a community with limited access to recovery centres or high degrees of stigma towards addiction would be negative. Another example may be debut age. Debut age may be regarded as a form of negative capital in the sense that a young debut age when beginning regular substance misuse is associated with more severe substance misuse later in life (Cloud & Granfield, 2008).

Recently, Best et al. (2020) have developed the "Strengths and Barriers Recovery Scale" (SABRS) to assess barriers and strengths to recovery, focusing on negative and positive experiences and events. These events or experiences are translated into positive and negative RC. The SABRS consists of items with yes/no answers, such as "have good nutrition" (recovery strength item) or "smoke" (recovery barrier item). This scale represents a valuable way of empirically measuring different strengths and barriers to recovery at different stages of the recovery process. Although the SABRS does not represent RC on a continuum as proposed by Cloud and Granfield (2008) as the items have binary answers, it still captures particular strengths and barriers in a meaningful way. For

instance, the SABRS has been used to investigate the ratio of recovery strengths and barriers for people in active addiction versus those in recovery (Best et al., 2020). The findings suggest that different kinds of close social relationships were associated with greater reductions in barriers to recovery and more positive changes in recovery strengths (Best et al., 2021). Best et al. (2020) and Best et al. (2021) emphasise that a limitation to these studies is that the sample is self-selected, meaning that the participants' recovery status and previous substance use experience are unexamined. Thus, it is uncertain whether the results apply to SUD patients in recovery. Self-selection bias is considered a common challenge to social sciences, such as psychology (Ziliak & McCloskey, 2008).

A strength of RC is that it may be used regardless of which definition of addiction recovery one uses (Best & Hennessy, 2021). Currently, there is no consensus on the operationalisation of recovery. Some define recovery as the total absence of substance use, while others allow for various degrees of use. Furthermore, operationalisations vary in the extent to which they focus on different aspects such as personal functioning, social functioning, well-being, and other factors (Best & Hennessy, 2021; Bjornestad et al., 2020).

5.1.4 Positioning the project in the recovery context

In this thesis, I understand recovery as including a considerable reduction in substance use and improved functioning and well-being. However, as recovery is a complex phenomenon, it is necessary to reduce it in order to measure it empirically. In this thesis, I mostly employ a clinical recovery framework. There are three main reasons for my choice: a) I use quantitative data; b) there is no consensus on recovery operationalisations; and c) the thesis should be relevant for clinical practice.

Since I used quantitative data, I found it more appropriate to use a definition closer to clinical recovery than to personal and relational recovery. Clinical recovery has clearer criteria for recovery which are more readily operationalised compared to personal and relational recovery. However, I considered operationalisations of clinical recovery that only included abstinence and did not include time criteria as too narrow. Therefore, I included functional measures and temporal criteria in addition to substance use reduction. Overall, this means that this thesis operates with a definition of SUD as a disorder with distinct symptoms.

My approach has certain limitations. A main limitation is that the subjective and personal view of recovery remains unexamined. I also encountered a challenge when including other recovery measures, such as meaning in life, as the statistical models collapsed. The data quality simply was not good enough.

I chose the clinical recovery framework because there is no consensus on recovery conceptualisation. I found it more appropriate to apply measures showing reduction in substance use and changes in functioning rather than focusing on functional measures alone, which I find personal and relational recovery frameworks to primarily do. As mentioned above, this is a matter of degree. Nevertheless, my thesis may be criticised for being caught in a medical framework and focusing too much on the *inner* qualities of recovery rather than recovery as an inherently social process.

I believe that the clinical recovery framework has something to offer therapeutic practice, in the sense that it may contribute to improve the course and outcome of SUD treatment. Research on clinical recovery may contribute evidence to support effective treatment interventions that may provide insights into how care could be tailored to individuals. Thus, it may provide clinicians, as well as service users and their families and support systems with valid and applicable evidence-based knowledge about what type of treatment may facilitate recovery. Clearly,

psychiatry should offer the best-studied and best-tested treatment currently available.

The clinical recovery framework does not necessarily promote a medicalised view of recovery although it might be at risk to do so. For instance, the disease concept in the DSM-5 seems at times to be based on a far-fetched rationalism which may neglect subjectivity and its context (Moe & de Cuzzani, 2022). I consider the clinical recovery framework to have a more consistent terminology compared to personal and relational recovery, which enables a conceptually transparent investigation. This may in turn make the research findings easier to implement in, and to inform, clinical practice.

In general, clinical recovery is considered as an outcome, and one that is invariant across individuals, based on objective and researcher-derived criteria (Slade, 2009). Liberman and Kopelowicz (2005) emphasise that symptom remission alone is an inadequate understanding of recovery and that it should therefore include functional measures, such as employment or school and supportive friendships. Although clinical recovery does not include a subjective view of recovery, it may include functional aspects and encompass variation between individuals. As I agree with Liberman and Kopelowicz (2005), I included measures of personal and social functioning in our operationalisation of clinical recovery. If this had not been included in papers II and III, these studies would mostly have been reiterations of previous SUD research that has mainly focused on substance use outcomes rather than functioning and well-being. Additionally, clinical recovery may include a temporal criterion, often suggested to be two years of stable change. For research purposes, researcher-derived and temporal criteria are helpful in creating an empirical definition to measure clinical recovery consistently.

The concept of clinical recovery is useful from a clinical perspective. In my experience as a clinical psychologist treating SUD patients, I have found it helpful to track patient progress while simultaneously seeking

to include subjective and objective aspects of recovery. Patient lack of insight is suggested to be common for many psychiatric conditions, such as SUD (Thirioux, Harika-Germaneau, Langbour, & Jaafari, 2020). Thus, objective and subjective criteria for measuring patient progress seem beneficial to track treatment progress, especially when providing specialised health treatment services.

I do not put forward a particular operationalisation of recovery in paper III. However, I consider this paper's focus to be positioned within a clinical recovery framework. I should emphasise that the inclusion of functional measures does not imply I studied personal and relational recovery in papers II and III, in the way that they are normally conceptualised (see e.g. (Leamy et al., 2011; Price-Robertson et al., 2017)). For instance, I included psychological functioning in paper II, and this variable does not entirely reflect *personal recovery*. The focus on drug-free friendships in paper III was an attempt to acknowledge SUD recovery's relational aspects. However, looking at the definition of relational recovery, it is safe to say that my paper does not encompass this phenomenon in its entirety.

The use of the recovery concept in this thesis resonates with the Betty Ford Institute Consensus Group's definition of recovery as a process which consists of maintained voluntary lifestyle changes involving sobriety, (personal) health, and citizenship (The Betty Ford Institute Consensus Panel, 2007). Moreover, I focus on different stages in recovery, which resonates with The Betty Ford Institute Consensus Panel's categorisation of early (<1 year), sustained (1-5 years), and stable (>5 years) recovery. In this thesis, I focus more on early and late relapse. I understand remission and recovery as interconnected: SUD patients must fulfil some remission criteria in order to be classified as in recovery. More specifically, I consider it necessary to show sustained reduction or cessation in the frequency/intensity, quantity, and risky substance use for at least two years. Presumably, after two years of tracking stable change, including decreased symptoms and increased

functioning, change has begun to consolidate, despite the possible experience of relapse or lapse (Hegelstad et al., 2012; Liberman et al., 2002). Although this mainly applies to clinical recovery, I consider stable change critical to personal and relational recovery too as this is relevant for the conceptualisation of *recovery from* as well as for *recovery in*. Thus, I consider functional improvement relevant for personal and relational recovery. What sets personal and relational recovery apart from clinical recovery is that the former implies an understanding where symptom reduction is understood to be of less importance and the focus is more on functioning and well-being and intersubjectivity.

I do not consider recovery to be only a subjective phenomenon, meaning that one is in recovery if one feels like one is. In any case of recovery without symptom reduction, I consider it essential to show improved functioning (Harding, Brooks, Ashikaga, Strauss, & Breier, 1987) or norm-producing capabilities (Canguilhem, 1991). Here there might be convergence between *recovery in* and *recovery from*. *Recovery in* does not necessarily include symptom reduction but often includes improvement in functioning and well-being (Davidson & Roe, 2007). *Recovery from* presumes improvement in symptoms and returning to a healthy state of living after a disease. Thus, they convergence in terms of focusing on improved living, i.e. 'functioning and well-being' and 'healthy state of living'. However, while not everyone who suffer from severe SUD may be symptom-free in the near future, they may still seek improved well-being or wish to be a contributory citizen, i.e. exhibit recovery. My approach may fail to acknowledge this aspect. By choosing to focus on clinical recovery, my position becomes anchored in a medical framework. In this respect, my research may risk focusing too much on SUD rather than the whole person.

A possible consequence of this is that my thesis may overlook those who are in partial recovery. I have clear cut-offs of recovery, at least in terms of relapse. Most studies indicate that about 50% of patients partially

recover (Davidson & Roe, 2007). A further limitation to my approach is that it does not provide insights into how recovery evolve for this group.

Even in the case of clinical recovery, as postulated by Liberman et al. (2002), recovery is not merely a matter of symptom reduction. The inclusion of other aspects evaluated to be essential to healthy living (or not too much suffering) is needed. In relation to SUD recovery, I consider abstinence or reduced substance use as necessary components to obtain and maintain recovery. In the DSM-5, SUDs refer to a problematic pattern of substance use leading to clinically significant impairment or distress (American Psychiatric Association, 2013). In a sense, I find it somewhat counterintuitive for a person to be in recovery and have a problematic pattern of (any) substance use leading to clinically significant impairment or distress (American Psychiatric Association, 2013). If a person has such a problematic pattern of substance use leading to clinically significant impairment, it may indicate that their life is dominated by substance use. I consider all three recovery frameworks relevant and interrelated, and likewise for the three dimensions of RC. However, in this thesis I focus mostly on clinical recovery.

In the initial research phase, my understanding of recovery was that it was a complex and multidimensional field. I still consider this to be the case, but in the progression of this research project it has shown me that I am also anchored in a clinical recovery framework. I believe that one factor that led me more towards a clinical recovery framework is its focus on measuring phenomena consistently and thoroughly. Working with statistical modelling, I believe solid measures to be critical. This was something I felt was lacking in the field after finishing paper I. Furthermore, I consider clinical recovery to be more advanced in terms of conceptualising recovery compared to personal and relational recovery frameworks.

However, one problem with clinical recovery is that it tends to operate with too short time spans and a too narrow conceptualisation. I hoped to mitigate these shortcomings with this thesis. Hence, I wanted to develop the definition of clinical recovery and include a longer time period as well as functional measures and well-being. I believe I have partly accomplished this. The findings of this thesis may thus be of value to clinical practice, but perhaps not to patients who are in partial recovery.

Other key SUD concepts: abstinence, remission, relapse, lapse or slip

Clinical recovery is reminiscent of remission. *Remission* is defined as a reduction or significant decrease in symptoms of a disease or disorder (VandenBos, 2007). The DSM-5 divides remission into early and sustained (American Psychiatric Association, 2013). Early remission is defined as being symptomless for at least three months but less than 12 months after receiving a SUD. Sustained remission is defined as being symptomless; none of the criteria for SUD is present for 12 months or longer after receiving a SUD. However, the definitions state that it is possible to have criteria A4, craving, or a strong desire or urge to use a substance and still be in sustained remission.

Abstinence refers to the act of refraining from using something, often illegal substances or alcohol (VandenBos, 2007). *Relapse* is the recurrence of a disorder or disease after a period of improvement (VandenBos, 2007). For SUD, the definition implies a return to previous levels of symptoms after considerable substance use reduction or abstinence. *Slip* or *lapse* is a momentary loss of deliberate control (VandenBos, 2007). None of these three include a time criterion. Without a temporal criterion it may be more challenging to distinguish between short-term and long-term abstinence and early and late relapse. Slip is supposed to be "momentary", i.e. brief or short. It may be difficult to distinguish between different slips in relation to severity (e.g. how much one uses and how many substances). Moreover, "momentary" may be too ambiguous. In this thesis, I have no clear definition of these three

terms. However, I consider long-term abstinence to be two years or longer, and I employ the same time span for late relapse, since it is plausible that after two years of stable behavioural change, this change has begun to consolidate (Hegelstad et al., 2012; Liberman et al., 2002).

Relying mainly on the DSM-5's definition of remission may be too narrow since it focuses on symptoms rather than on what makes a drug-free life worth living (e.g. focusing on the quality of life; acknowledging broader functional outcomes (Friesen, 2019)). In this thesis, clinical recovery includes more extended temporal criteria and functional measures compared to the definition of remission. Presumably, having (supportive) drug-free friendships and employment or another meaningful activity aids recovery. However, as shown above, the definition of clinical recovery does not capture all aspects that may be essential for successful recovery. Comprehensive and exhaustive explanations are not the goal, but to measure (clinical) recovery empirically and reliably. Slade et al. (2012) argue that the scientific foundation of recovery frameworks mainly consists of expert opinion and qualitative studies. Consequently, more quantitative evidence is needed to support the development of recovery frameworks.

Operationalising a phenomenon includes reducing it in order to measure it empirically. My operationalisation of clinical recovery is no exception. My definition of clinical recovery neither includes meaning in life (personal recovery) nor social determinants (relational recovery). Therefore, it is vital to include these frameworks in the discussion section of this thesis. In science, contaminating factors are often removed to study specific relationships. If specific relationships are found, the task involves adding back contaminating factors (more on this in section 9.1). In relation to this, if I find specific relationships in my analyses, it is a matter of adding back factors that were removed or that were not included.

6 Objective

Primary objective

In order to achieve the secondary objective (specified below), it was essential to examine the current knowledge base of late relapse. This is a underresearched field and there is no consensus on operationalisations and temporal criteria. Therefore, we conducted a systematic review of relapse operationalisations after short-term and long-term abstinence, remission, recovery, and slip/lapse. We included these other phenomena in our review since they are closely related to late relapse. The objective was to provide knowledge about how these concepts are operationalised in SUD research in order to be observed and measured. Further, the review aimed to enhance the chance of deploying a 'late relapse' operationalisation consistent with current research in our studies.

Secondary objective

The secondary objective has been to investigate how psychological functioning and drug-free relationships, gender, and debut age are associated with alcohol and drug use trajectories, symptomatic remission, functional remission, and clinical recovery annually across four and five years after SUD treatment. I consider positive drug-free relationships vital to obtain and to maintain recovery due to previous research findings and the fact that humans are relational beings. Moreover, I regard psychological functioning as pivotal to obtaining and maintaining recovery as it is associated with mental health and SUD recovery. In the Stayer project, it is possible to assess changes in these aspects naturalistically.

Research question study II: I hypothesised that improved psychological functioning would predict the likelihood of obtaining and maintaining clinical recovery across five years. My rationale was that improvement in several psychological abilities, such as: controlling impulses and changing behaviour; shifting between activities; and regulating emotions

appropriately (tolerating change); as well as initiating or being proactive in new activities, making plans and setting goals for the future, and monitoring and assessing one's recovery progress, would be associated with a greater likelihood of clinical recovery attainment and maintenance after SUD treatment. Specific hypotheses were:

1) Participants are more likely to obtain and maintain symptomatic remission over five years if they experience improved psychological functioning.
2) Participants are more likely to obtain and maintain clinical recovery over five years if they experience improved psychological functioning.

Research question study III: I hypothesised that having drug-free friendships would be associated with a reduction in alcohol and drug use and that debut age and gender would be associated with use trajectories across four years. The recovery literature and research mostly suggest that there may be a positive association between individuals' recovery and supportive drug-free friends. However, as mentioned previously, this may differ over an extended period. Moreover, it may not be the case for persons having problematic polysubstance use. Longitudinal research on these parameters has been scarce. Although there are few longitudinal studies on gender, debut age, and use trajectories, the recovery literature indicates that males and females have different recovery needs. Moreover, early onset of substance use is associated with more severe substance use later in life compared to late onset. Therefore, I thought it would be interesting to investigate if this is the case for a Norwegian PSUD sample across four years. Specific hypotheses were:

1) Participants having drug-free friends would have lower drug and alcohol use annually across four years compared to those who had not.

2) Earlier debut age (below 13) of drug and alcohol use would be associated with drug and alcohol use trajectories across four years compared to those with later debut age onset of drug and alcohol use.
3) Male participants would have a greater chance of being in drug and alcohol use trajectories than would female participants.

7 Methods

7.1Systematic review

Objective

To investigate the knowledge base of operationalisations of relapse after long-term abstinence. To this end, we examined operationalisations of abstinence, remission, recovery, slip or lapse, and relapse as we believe they influence the conceptualisation of 'relapse after long-term abstinence.' A systematic review is a great way to inform the design and objective of new research (Nørgaard et al., 2022).

Introduction

An essential aspect of systematic reviews is that they are transparent and concise. Groves (2008) stressed that unclear reporting has been a problem in systematic reviews and that specific guidelines are needed regarding how to conduct and report research. We will accommodate this challenge by using recommended guidelines. Moreover, we used the PROSPERO international prospective register of systematic reviews, a registration form for the review we were planning. The University of York is responsible for safeguarding and approving the registration form. PROSPERO includes protocol details for systematic reviews relevant to health-related outcomes. Our protocol was registered in the International Prospective Register of Systematic Reviews (PROSPERO) in October 2019 (registration number: CRD42020154062). We used the preferred reporting items for systematic reviews and meta-analysis protocols (PRISMA-P) 2015 statement (Liberati et al., 2009; Moher et al., 2015; Shamseer et al., 2015). PRISMA-P consist of a 17-item checklist envisioned to assist the preparation and reporting of a proper protocol for systematic reviews.

Assessment and selection of research literature

Two researchers (FM and JB) independently searched the literature using the following databases: Epistemonikos, Cochrane Central Register of Controlled Trials (CENTRAL and DARE), MEDLINE, EMBASE, Google Scholar, CINAHL, Web of Science, and PsycINFO. Variations and combinations of terms targeting five main concepts were used in the search: relapse, abstinence, remission, recovery, and slip. An information scientist reviewed the search queries. A manual literature search was also performed using reference lists of reviews and meta-analyses identified in the main search. In cases of doubt, the full-text paper was read to determine eligibility. There was no time limit for the included studies. The last search was conducted on January 8th, 2021.

We included articles meeting all of the following criteria:

- Empirical study published in English in peer-reviewed journals.
- Study sample meets diagnostic criteria for dependence syndrome in ICD-10 (World Health Organization, 1993) or moderate–severe drug use disorder (DUD) or alcohol use disorder (AUD) in DSM-IV (American Psychiatric Association, 1994) and DSM-5 (American Psychiatric Association, 2013).
- Reports relapse, abstinence, recovery, remission, short- or long-term, slip or lapse.

We excluded all articles meeting the following criteria:

- Studies reporting on smoking and/or smoking and alcohol/AUD only.
- Animal studies.
- Case studies.

Handling the research literature

All potential studies were exported into a reference citation manager (Endnote) before duplicates were removed. Two reviewers (FM and JB) independently performed the screening of titles and abstracts and full-

text analysis. In cases of doubt, the full-text paper was read to determine eligibility. The synthesis of the definitions and selection of outcomes were developed during 11 consensus meetings. Disagreements were resolved through discussion until consensus was reached. A third reviewer (JRM) was available to resolve disagreements and provide critical feedback.

Narrative synthesis of the research literature

A narrative synthesis was performed for the included articles. A narrative synthesis is a textual approach seeking to 'tell a story' about the findings from the included studies focusing on questions beyond the effectiveness of a particular treatment (Popay et al., 2006). The purpose was to assess different levels of detail in operationalisations and discuss the implications of comparing and implementing studies deploying different operationalisations of the same concepts. We aimed to use this analytic approach for mapping the diversity in the field. Hence, the synthesis focused on the separate elements building up the whole of the empirically based operationalisation.

The first step for each included article was to assess sample description and substance type; length of follow-up; study aim; frequency of measuring points; operationalisations of *abstinence*, *remission*, *recovery*, *relapse*, and *slip*; measuring instruments; and other relevant information for relapse assessment. The second step was to tabulate the articles' primary findings, focusing on the operationalisations of *abstinence*, *remission*, *recovery*, *relapse*, and *slip*. In step three, we conducted a step-by-step thematic classification of each of the five groups of operationalisations, and operationalisations were subdivided into separate categories/themes based on similarity; for example, every operationalisation of *relapse* that primarily used urine analysis, breathalyser, or blood sample to assess relapse was grouped under the theme 'biomarker'. In step four, we grouped themes from step three into overarching themes. Thus, operationalisations of *relapse* that used

biomarkers or other measuring instruments, such as DUDIT[1] or AUDIT,[2] were grouped together under the overarching theme *measure*. The rationale was that *measuring* was a primary theme in the operationalisation of relapse (see Limitations for further elaboration).

Since each operationalisation was divided into several themes, the result was more themes than operationalisations. For example, *relapse* operationalisations often contained different time criteria and use criteria for assessing a relapse, and these criteria were subdivided into separate themes. This process led to several themes of both time criteria and use criteria. For example, when grouping time criteria together, we assessed similarity in length. Further, we determined which subdivided themes were more frequent than others. As there were several subdivided themes relating to time, *time* was chosen as an overarching theme, based upon agreed similarities. The rationale for subcategorising the operationalisations was to obtain a thorough overview of the relevant components of each operationalisation.

To assess long-term studies and the frequency of measuring points that were used to define 'relapse' after long-term abstinence, the cut-off was set to studies with a follow-up of at least two years. Following cut-offs in remission according to diagnostic guidelines in DSM-5 and ICD-11 (12 months) (American Psychiatric Association, 2013; Basu & Ghosh, 2018) and research (three years) (Calabria et al., 2010; Fleury et al., 2016), our two-year criterion may be regarded as a practical tool and a minimum criterion for identifying long-term studies. To determine factors relevant for defining 'late relapse', we investigated time criteria for abstinence, remission, and recovery since these factors are used to define periods of non-use and may be used to distinguish early from late relapse.

[1] Drug Use Disorder Identification Test.
[2] Alcohol Use Disorder Identification Test.

7.2 Quantitative methodology

The Norwegian Stavanger study of Trajectories of Addiction

The Norwegian Stayer project is a naturalistic, prospective cohort study aimed to shed light on cognitive, psychological and social recovery processes over a period of ten years. The Stayer project includes measures of substance use, satisfaction with life, psychological distress, and ADHD symptomatology, as well as neurocognitive functioning to ensure that it captures most of the relevant dimensions underlying recovery. The Stayer project is a data platform enabling several studies on the cohort, including this thesis. Thus, like most longitudinal cohort studies, the Stayer project serves as a foundation for conducting several studies.

As a cohort study, the Stayer project follows SUD patients' who started a new treatment sequence in the Stavanger University Hospital catchment area. Prof. Sverre Nesvåg, Egon Hagen, PhD, and the Center of Alcohol and Drug Research Western Norway (KORFOR) initiated the project in 2012.

Data was collected from SUD patients admitted to outpatient and residential treatment facilities. Participants were tested after two weeks of abstinence to minimise contamination from drug withdrawal and acute neurotoxic effects from psychoactive substances (Miller, 1985). The first two years consist of quarterly measures (follow-up), while years three to ten consist of annual measures (follow-up). Data collection will be completed in 2025. This thesis is not related to prior publications based on the Stayer project dataset, and my thesis is not a secondary analysis of the Stayer project. Although some of the measures have been used in other studies with different research questions, they have yet to be used across four and five years. For example, measures in the first year of follow-up have been used before (see e.g. (Hagen et al., 2017)), but not across four or five years, as these data became available during my PhD

period. Between the fall of 2019 and 2021, the raw data was processed and made available for my analyses.

The STAYER project's relation to SUD recovery

The project focuses on cognitive, psychological, and social recovery processes related to changes in substance use among people with SUD. The aim of the project is to describe the trajectories of addiction and the recovery of addiction and to identify clinical markers that can help predict these trajectories. Measures included in the Stayer-project relevant to this thesis are: the Symptom Check List-90-R (SCL-90-R), the Satisfaction With Life Scale (SWLS), the Behavior Rating Inventory of Executive Function (BRIEF-A), Alcohol Use Disorder Identification Test (AUDIT-C), Drug Use Disorders Identification Test (DUDIT-C), age, gender, job status, and social functioning.

As mentioned above, the Stayer project was developed to investigate cognitive, psychological, and social recovery processes related to changes in substance use among people with SUD who started a new addiction treatment. Moreover, the project is a prospective naturalistic follow-up cohort study (longitudinal and observational), i.e. it follows a SUD patient sample who started a new treatment sequence across ten years with very little interference to observe recovery processes in its natural setting. The Stayer project is neither a treatment study nor a study of treatment effects. Although I do not have information about each patient's treatment goal, I will suggest that the patients may have wanted to get treated for their SUD. However, this neither indicates that they seek recovery nor that they were in treatment by choice. For example, others may have motivated them to seek treatment while they themselves did not want to get treated, or they may have been convicted for a misdemeanour or felony resulting in that they served their time in treatment. Notwithstanding, I considered the project an opportunity to investigate SUD patients' recovery processes after their treatment, even though I cannot infer the effect of the treatment on their recovery.

The participants were recruited from several public and private treatment centres in the Helse Stavanger region. These include outpatient and inpatient clinics from Stavanger University Hospital (public, three outpatient and two inpatient clinics), Rogaland A-senter (private, two inpatient and one outpatient clinic), Frelsesarmeens behandlingssenter (FAB) (private, two inpatient clinics), Fjordhagen (private, one inpatient clinic) and K46 (public, one inpatient and one outpatient clinic). All private clinics delivered clinical services to the Western Norway Regional Health Authority by contract. Unfortunately, we do not know how long each participant stayed in treatment. The limitation of not knowing how long participants stayed in treatment and how much treatment they received will be discussed in the limitations section below (Chapter 10). See Figure 1 (Chapter 14) for a flow chart of the treatment characteristics and dropout during the follow-up period. In the flow chart, fewer research participants are available than in our research papers. This is due to having applied missing data imputation techniques (specified below in the sample section: "*Sample in papers II and III*"). Our sample included 164 participants after the exclusion criteria assessment.

The candidate's role in papers I, II and III

In paper I, my role was to set the research aim and determine how to complete it. I made the study protocol that was registered in the International Prospective Register of Systematic Reviews (PROSPERO). I made a list of variations and combinations of terms targeting the five main concepts in the database search, which was quality controlled by an information scientist (for specifics, see section 7.1 systematic review).

Assessing recovery variables for papers II and III

In papers II and III, my role was to organise and quality control the dataset to ensure it was ready for statistical analysis, i.e. choosing which

variables to include in the study based on the research questions. This part of the dataset had not been used in prior analyses and was not processed before I started my analyses (see specifics below in the next section). Before my PhD project was announced in public, the dataset was controlled to ensure that it contained recovery variables. Based on the available variables, I selected those I deemed most appropriate to illuminate social and psychological factors related to relapse occurring after two years of abstinence. I also had in mind which factors would be more fitting in a personal and relational recovery framework.

Statistical analyses of recovery variables

Based on the dataset, I made several hypotheses which I considered possible to analyse based on the available dataset. I presented these to my supervisors and Dr Tore Tjora, who, together with me, had the primary responsibility for statistical analysis, i.e. applying statistical techniques to analyse the dataset (see co-author statement appendix). We discussed my suggestions and what was possible to accomplish with the dataset and specific statistical modelling techniques. In the pre-analysis phase, we discussed several longitudinal approaches, such as structural equation modelling (SEM), latent growth curve modelling (LGM), and latent class analysis (LCA), as these methods have been deemed suitable for analyses of similar longitudinal data. LGM is suitable for studying developmental processes, while LCA is suitable for studying different subgroups in a sample sharing particular characteristics and how they change over time. I then made several hypotheses that could be analysed statistically.

Challenges with statistical analyses of recovery variables

Together with Dr Tjora, I tested different LGMs and LCAs. However, it was only possible to use LGM to investigate the hypothesis in paper III. There may be several possible explanations as to why the LGMs and LCAs did not work. First, it may be a result of too few participants, a probable explanation as the sample size is considered to be small for both

LGM (Shi, DiStefano, Zheng, Liu, & Jiang, 2021) and LCA (Weller, Bowen, & Faubert, 2020). Second, it may result from too low a temporal resolution since we used yearly measures. We tried using the quarterly data, but the data quality on the quarterly measures was too poor for this purpose. Third, it may be possible that drug use development does not fit an LGM over time, e.g. the development of drug use does not correspond to the simple postulated growth curve models. Further, it is conceivable that the lack of good LCA models may be a result of drug use development does not fit in latent classes either. Due to the small sample size and relatively low temporal resolution, we are not able to conclude either way, as the poor fit may have all the above-mentioned explanations and most likely combinations thereof.

Therefore, we chose to use simpler methods. We explored the use of logistic regression analysis and multiple imputation to investigate social predictors of early and late relapse, i.e. whether having drug-free friendships and employment would reduce relapse risk after one and two years of abstinence. However, this model did not work, possibly due to the above-mentioned reasons. Since the variables in papers II and III are mostly dummy variables that can be analysed at an interval level, we tried to use regression analysis. This would have enabled us to investigate how much the given variables interact and how much they could have explained recovery and relapse. We applied regression analysis to our data, but it was not possible to analyse the research questions, which may be a result of having a too small sample size and too low temporal resolution. In paper III, we tried to do a correlation analysis rather than a chi-square analysis to get a more precise measure of strength and direction in addition to the deviation between statistically expected and observed frequencies. However, the data was not suitable for correlational analysis.

To summarise, although the data quality was too poor to conduct particular complex analyses and include relevant covariates, it was

deemed good enough for conducting other analyses and generating hypotheses.

Sample in papers II and III

Sample

We recruited the study sample (n=208) from the ongoing Norwegian Stavanger Study of Trajectories in Addiction (STAYER) – a prospective naturalistic follow-up study of change trajectories among people diagnosed with SUD, investigating the course and timing of neurocognitive and psychosocial factors, including recovery (Hagen et al., 2016; Svendsen et al., 2017). Participants were recruited from SUD treatment programmes carried out between March 2012 and December 2015. They were recruited at the start of their treatment in the outpatient or residential treatment facilities in the Stavanger region of Norway. The sample consists of patients with SUD, alcohol use disorder, and behavioural addictions. The STAYER study has been approved by the Regional Ethical Committee (REK 2011/1877). All participants provided written informed consent. Studies II and III were not pre-registered, and the results should be considered exploratory.

We included individuals who met the following criteria: starting a new treatment sequence within addiction treatment services; age ≥16; and enrolled in a treatment programme to which they were admitted for at least two weeks. The treatment programs varied in content. Two hundred and eight participants were eligible for inclusion. Of these, 44 (22%) had only alcohol use disorder or behavioural addiction. They were excluded from this study as it focuses on poly-substance use. Thus, 164 participants were included. In paper II, we used an imputation method to impute missing data (detailed below) and were able to use all 164 participants in the annual follow-ups, from baseline to the fifth year. In paper III, due to missing data, 155 participants were included in most

analyses. Details on the STAYER study methodology and retention have been published previously (Svendsen et al., 2017).

Method and measures: Paper II

Objective

We investigated the predicting role of psychological functioning on symptomatic remission and clinical recovery annually across five years. We also assessed the influence of gender and age on symptomatic remission and clinical recovery.

Measures

Age was calculated by subtracting birth year from the year of inclusion in the study at baseline. Gender was reported at baseline. Demographic data were collected using a semi-structured interview made for the Stayer project. The semi-structured interview schedule was part of the National Quality Register for Substance Abuse Treatment (KVARUS/NQR-SAT) (Stavanger University Hospital, 2020).

Clinical measures

Drug and alcohol use – We used the Drug Use Disorders Identification Test (DUDIT) (Voluse et al., 2012) and the Alcohol Identification Disorder Test (AUDIT) (Babor, De La Fuente, Saunders, & Grant, 1992; Berman, Bergman, Palmstierna, & Schlyter, 2005) to assess drug and alcohol use. Both DUDIT and AUDIT have been found to have good reliability and validity (Bohn, Babor, & Kranzler, 1995; Hildebrand, 2015; Meneses-Gaya, Zuardi, Loureiro, & Crippa, 2009; Voluse et al., 2012). We used DUDIT-C, which consists of the four consumption items measuring drug consumption, to measure drug use (Basedow, Kuitunen-Paul, Eichler, Roessner, & Golub, 2021; Berman et al., 2005), while we used AUDIT-C, which consists of the three AUDIT consumption items, to measure alcohol use (Campbell & Maisto, 2018). We made composite variables of DUDIT-C and AUDIT-C scores.

Psychological functioning – We used the Behavioral Rating Inventory of Executive Function — Adult Version (BRIEF-A) (Gioia, Isquith, Guy, Kenworthy, & Baron, 2000; Roth, Isquith, & Gioia, 2005) to measure psychological functioning. This 75-item self-report measure assesses everyday executive and self-regulatory functioning. For patients with SUDs, BRIEF-A scores also correlate with psychological distress scores on a scale and case level (Hagen, Sømhovd, Hesse, Arnevik, & Erga, 2019), making it well-suited to assess psychological functioning for this study. The BRIEF-A is composed of nine subscales and three composite scores. The Behavioral Regulations Index (BR-index) consists of the subscales: Inhibit, Shift, Self-Monitor, and Emotional-Control. The Metacognition Index (MI) consists of the subscales: Initiate, Plan/Organise, Working Memory, Organisation of Materials, and Task-Monitor. When combined, the BRI and MI produce the overall Global Executive Composite (GEC). Responses are scored on a scale of: 'never' = 1, 'sometimes' = 2, and 'often' = 3. The recommended clinical cut-off score is BRIEF-A GEC ≥65 (Roth, Isquith, & Gioia, 2014), where higher scores represent poorer executive functioning.

Predictor - The predictor variable was the patient's level of psychological functioning measured by the BRIEF-A GEC score. This variable enabled us to independently test the contribution of psychological functioning for symptomatic and functional remission and clinical recovery status at six different points in time. We defined 'high BRIEF-A' as BRIEF-A GEC ≥65, based on previous research (Roth et al., 2014). We constructed a dichotomous, crude longitudinal BRIEF-A variable by comparing participants with 'high-BRIEF-A' from baseline through third annual follow-up with participants' 'high-BRIEF-A' from fourth through fifth annual follow-up. We also analysed a one standard deviation reduction on BRIEF-A GEC between baseline and fifth follow-up, as we believe this may reflect a considerable increase in psychological functioning.

Outcome measures

Symptomatic remission – Symptomatic remission was operationalised as DUDIT-C scores equal to 0 and AUDIT-C scores ≤2. We defined five different 'remission lengths' as having one to five subsequent remission scores. We did not consider when the participants had their remission during the course.

Functional remission – Functional remission was operationalised using two variables related to social functioning status. The first was 'employment or having other meaningful activities'. This self-report questionnaire has been implemented in the National Quality Register for Substance Abuse Treatment (KVARUS/NQR-SAT). The KVARUS relates to SUD patients enrolled in treatment and has previously been used for research purposes (Carlsen, Lunde, & Torsheim, 2020). KVARUS gathers Patient-Reported Outcomes Measures (PROM-data) and Patient-Reported Experience Measures (PREM-data) (Carlsen, Lunde, & Torsheim, 2019). PROM-data contains patient perceptions of their health, while PREM-data contains patient perceptions of their experience of health care or treatment (Carlsen et al., 2019). We measured 'employment or having other meaningful activity' using the same question at baseline and all follow-ups: 'Are you engaged in paid work or other meaningful activity?' together with the responses 'No,' 'Yes,' and 'Other meaningful activity'. These questions were used to make dichotomous variables on employment and other meaningful activity as compared to no employment or other meaningful activity.

The second variable used to measure functional remission was 'drug-free friends'. We used 'drug-free friends' to measure social support, collected by way of a self-report questionnaire (KVARUS). 'Drug-free friends' has previously been used in research to measure social resources (Carlsen et al., 2020). Having 'drug-free friends' was measured using the same question at baseline and all follow-ups: 'Do you have friends

without a history of substance use?' together with the responses 'Yes' and 'No'. We further constructed a dichotomous variable ('functional remission') for the combination of having 'drug-free friends' and 'employment or having other meaningful activity' – having both 'drug-free friends' and 'employment or other meaningful activity' were coded as 1, while all other combinations were coded as 0. Thus, participants scoring 'yes' on both social variables were categorised in functional remission.

Clinical recovery – Clinical recovery was coded as a single variable of 'yes' for all individuals who met both criteria for symptomatic and functional remission. Similar to symptomatic remission, we defined five different 'recovery lengths' as having one to five subsequent recovery scores. As with remission, we did not consider when the participants obtained their recovery scores during the course of the follow-up period, just that they were defined as recovered for a given number of subsequent follow-ups. Housing was excluded from the recovery measure. All participants had housing, which is the rule in this catchment area and for SUD populations generally in Norway. Hence, this variable was omitted as it did not add substantial value to our recovery analysis.

Missing data

We used the Caret version 6.0.90 running on R version 4.1.2 (2021-11-01) in RStudio 2021.09.1 Build 372 for Windows for bagged imputation based on multiple trees. This is a single-based imputation technique. Like other imputation techniques it uses information and relationships from the non-missing variables/predictors to provide an estimate to fill in the missing value (Kuhn & Johnson, 2019). Single-imputation techniques are more reliable than deletion techniques but less reliable than multiple imputation (Enders, 2010).

We exported all six measurement occasions of DUDIT-C, AUDIT-C, SCL-90-R, BRIEF-A, having drug free-friends and employment or other

meaningful activity in addition to id and gender from Stata. Gender, having drug-free friends and employment or other meaningful activity were defined as factor variables in R. We ran the imputation with all aforementioned variables and default settings before exporting the result back to STATA.

Data analysis

Statistical analyses were computed using Stata/IC 15.1 for Windows, with the exception of missing imputation described in detailed above. Stata/IC 15.1 is a statistical software package that helps users analyse, manage, and produce graphical visualisations of data material. Stata may be used to analyse data patterns between variables (Acock, 2008). Stata contains several options for statistical analysis and modelling. The aim of a given statistical model is to explain the data based on a hypothesis.

First, we made descriptive statistics for symptomatic remission, functional remission and clinical recovery over baseline and five-year follow-up. Second, we performed multiple T-tests, chi-square tests and Fisher's exact tests examining distribution of symptomatic remission and clinical recovery across gender and age for each of the five follow-ups. A T-test may be used to assess whether the means of two sets of data are significantly different, such as between gender and symptomatic remission. We used cross-tabulation to examine the difference between expected and actual frequencies between different combinations and a chi-square statistic to assess if the difference was significant. A high numeric value for the chi-square depending on the number of degrees of freedom (df) yields a low P-value. Df depicts the maximum number of independent values in the sample. Our null-hypothesis was that there was no difference, and our null-hypothesis stands for the expected frequencies. The chi-square increases when the difference between expected and actual frequencies is larger depending on df. If the chi-square goes above a specific threshold, then the relationship is significant. We also used Fisher’s exact test to test whether there were

non-random associations between our categorial variables. This test is useful for small sample sizes.

Third, we performed multiple chi-square tests and Fisher's exact tests to examine the distribution of symptomatic remission and clinical recovery across having four or more BRIEF-A scores ≥65. Lastly, we performed multiple chi-square tests and Fisher's exact tests to examine a one standard deviation reduction or more on BRIEF-A between baseline and fifth follow-up across various lengths of symptomatic remission periods and clinical recovery.

Method and measures: Paper III

Objective

We used participants' reports of drug-free friendships and alcohol and drug use to investigate polysubstance use disorder trajectories annually across four years after SUD treatment and the association between these trajectories and drug-free friendships, debut age and gender.

Measures

Age was calculated by subtracting birth year from inclusion year at baseline. Gender was reported at baseline. Age and gender were reported in descriptive statistics but were not used in the latent growth curve analyses.

Drug and alcohol use

See paper II above. However, we used DUDIT-C and AUDIT-C scales (ranging from 0 to 8 and 0 to 12), merging AUDIT-C and DUDIT-C by adding them together after dividing DUDIT-C scores by eight and AUDIT-C scores by 12. Further, we multiplied the result by four and rounded the result to whole numbers, making a scale from zero (no drug and no alcohol) to eight (max on both DUDIT-C and AUDIT-C scales). This new composite variable was termed 'alcohol and drug use'. For participants missing AUDIT-C, we used only DUDIT-C, and vice versa.

Participants with missing scores on both AUDIT-C and DUDIT-C were coded as missing at that timepoint. We calculated 'alcohol and drug use' for five yearly follow-ups. Previous research suggests that early treatment response measured at first follow-up is a good predictor of long-term treatment response (McKay, Lynch, Shepard, & Pettinati, 2005; McKay et al., 2013). Therefore, we excluded baseline measures from the latent growth models.

Drug-free friendships
See paper II above.

Data analysis
Descriptive statistics, data preparation and export were computed using Stata/IC 15.1 for Windows. Mplus version 8 for Windows was used for the latent growth curve models (LGM). We defined the 'alcohol and drug use' scale as continuous variables and used the standard maximum likelihood estimator in Mplus. As the 'drug-free friendships' measures were categorical, we used the Mplus standard for categorical dependent variables: the weighted least square mean and variance adjusted estimator (WLSMV-estimator) (Brown, 2015). To evaluate the fit for the tested models, we used the Root Mean Square Error of Approximation (RMSEA) and Comparative Fit Index (CFI). Both measures indicate the degree to which a model fits data. CFI scores closer to 1 and RMSEA scores closer to 0 indicate better model fit (Bollen & Curran, 2006). More specifically, CFI scores $\geq .95$ and RMSEA scores $\leq .05$ indicate good model fit (Barbara, 2012), while RMSEA scores between .05 and .08 have been deemed acceptable (Kim, Ku, Kim, Park, & Park, 2016).

First, we examined the association between 'alcohol and drug use' and 'drug-free friendships' across the last five follow-ups. We tested if these associations were significant using chi-square $\chi 2$-tests. Second, we ran multiple longitudinal models to examine possible models for understanding the association between 'alcohol and drug use' and 'drug-

free friendships'. We developed three LGMs. Model 1 (M1) investigated to which degree the LGM on longitudinal development in alcohol and drug use fits the data.

LGM is based on SEM and is used to measure development or growth processes or trajectories (Bollen & Curran, 2006; Duncan & Duncan, 2004). It is suitable for studying longitudinal data and annual change processes across time. LGM analyses latent (unobserved) variables, e.g. intercept and slope, which describe the trajectory of change over time in the observed variable (e.g. substance use) (Greenwood et al., 2019). The intercept and slope are growth factors based on the individual trajectories. The intercept represents the initial level, while the slope refers to the rate of change (Felt, Depaoli, & Tiemensma, 2017). They reflect growth patterns estimated on all the trajectories in the sample (per individual). This is why they are coined 'latent' since they are not variables in the dataset but based on these estimations.

We divided M1 into two groups based on gender. As the unconstrained model was not significantly better than the constrained model ($\chi 2$ difference = 11.32, df difference = 8, p = 0.18), we rejected gender groups in M1. Further, we divided M1 into two groups based on drug debut prior to the age of 13 versus debut at 13 and older. The unconstrained model was not significantly better than the constrained model ($\chi 2$ difference = 8.31, df difference = 8, p = 0.40). Hence, we kept M1 without groups (M1). However, as participants were selected based on alcohol and drug use at baseline, we removed baseline from the LGM and used this LGM as a predictor (M1 revised).

Model 2 (M2) investigated the degree to which an LGM fits the development of 'drug-free friendships'. The model was an LGM with two latent variables (intercept and slope) reflecting 'drug-free friendships' development based on five dichotomous variables. Hence, the model 'drug-free friendships' had too few degrees of freedom to

estimate model fit. Further, the variance on the slope was not significant. We therefore made a new model with intercept only (M2 revised). We chose to use the initial model (M2) because M2 fits conceptually better with 'M1 revised' when making model 3 (M3).

M3 was constructed by combining M1 revised and M2. Thus, M3 was a growth model for two parallel processes with categorical outcomes, 'alcohol and drug use' and 'drug-free friendships'. We allowed association between the two intercepts. Furthermore, we added a regression from the 'alcohol and drug use' intercept to the slope on 'drug-free friendships'. We also added a regression from the 'drug-free friendships' intercept to the slope on 'alcohol and drug use'. Finally, we made a figure for the final model, M3, reporting only significant and standardised weights (Figure 1 in paper III).

Relapse cut-off in study II and III

A cut-off value of 2 on DUDIT-C has been shown to be optimal when differentiating between patients without a SUD and those with mild or moderate SUD (Basedow et al., 2021). Although there is greater variation in the cut-off values used for AUDIT-C, it is suggested that the most *accurate* cut-off value, i.e. the value correctly classified as risky, is ≥4 for females and ≥5 for males. High-risk drinking, is classified as ≥8 for females and ≥9 for men (Khadjesari et al., 2017). In our quantitative studies, the relapse cut-off value for DUDIT-C scores equals 0 and AUDIT-C scores ≤2. One may reproach our suggested cut-off values for being lower than some previous research, as they seem to set higher requirements than what is the case for the general population (AUDIT-C), and that we seemingly promote an abstinence-based recovery understanding with such conservative cut-off values. This last point is particularly pertinent considering that recovery may be seen as including some use (Witkiewitz & Tucker, 2020) and symptoms (Friesen, 2019). This choice was motivated by a rationale to build on cut-off values from previous studies on the Stayer sample (Bjornestad et al., 2019; Svendsen

et al., 2021), as relapse cut-off values are suggested to be inconsistent in addiction research (Maisto et al., 2016).

7.3 Ethical considerations

The norms and values of research ethics may be thought of as integral to scientific practice and conduct. In Norway, there are three research ethic guidelines developed by the Norwegian National Research Ethics Committees. One of them is the National Committee for Research Ethics in the Social Sciences and the Humanities (NESH). NESH acts as an impartial advisory body that provides guidance and advice on research ethics. One aim of the guidelines is to promote good scientific practice.

When conducting research, several ethical considerations may be raised. These considerations may be placed within *normative ethics* which is concerned with how people *ought* to act. Normative ethics focuses on values, norms, and prescriptions of how researchers ought to practice. A value is a standard for evaluation, and norms presupposes values, e.g. "it is wrong to kill a human being or any being at all because humans or all life are valuable." Norms are rules for conduct or behaviour. In this sense, research practice and researcher conduct also belong to *applied ethics*, i.e. the analyses of the application of ethical knowledge. Applied ethics often includes several schools of normative ethics, such as duty, virtue, and utility ethics. Typically, these different schools of ethical thought discuss moral values concerning personal characteristics and interpersonal standards, i.e. people and actions.

Virtue ethics is concerned with what types of virtues researchers should have. Duty ethics asks whether researchers have (absolute) duties, while utilitarianism focuses on what kind of utility research is committed to produce. The NESH states both virtues and duties that researchers should follow and possess, such as "truth and method norms" (duties) and being responsible and having integrity (virtues) (NESH, 2022). NESH's focus on truth combines virtues and duties into *truthfulness* in order to avoid

e.g. scientific fraud. Evidence-based policies is an example of science as an instrument for policymaking – a perspective which is based on utilitarian ethics.

In this thesis, ethical considerations concern norms of truth and method, truthfulness, integrity, and responsibility, to mention some. I have the responsibility to communicate my research in a truthful manner both to the scientific community and society. As the Stayer study has been approved by the Regional Ethical Committee (REK 2011/1877) and all participants provided written informed consent, I will discuss ethical consideration about research participants, such as storage of data and confidentiality below. Nevertheless, I would already like to mention that in such cases, it is pivotal to have respect for individuals and human dignity and never use people only as means to an end but as an end in themselves.

In this thesis, it is furthermore relevant to mention co-authorship, as all papers in this thesis have been written with others. All co-authors must have contributed substantially to the studies such as in conceptualisation, data analysis and interpretation, and drafting and writing the manuscripts. Additionally, the co-authors must approve the final version of the manuscripts and take responsibility for them as a whole. In order to assess author contribution, we used the Vancouver recommendations for authorship (Fees, 2022) before and after each manuscript was completed. This ensured that each author had something to contribute both in the initial phase of each paper and their contribution thereafter. I have also used the Contributor Roles Taxonomy (CRediT) to highlight my contribution to each paper and my co-authors. The CRediT for each paper and co-author is highlighted in the co-author statement.

Finally, I will address transparency and data analyses and handling. In the systematic review as well as in the quantitative papers, it was important to reflect upon the ethical aspect in reporting of how we obtained our results. Such reflections entail transparent reporting of

methods used and how the analyses were conducted that led to the final results. When communicating my research (in the research community and in public), I should express clearly the boundaries and limits of our studies and their implications.

In research, data storage and sharing should be done responsibly. The dataset in the Stayer project is stored in a research server at the Stavanger University Hospital to ensure secure and legal storage. The data is stored pseudo-anonymously, meaning that each participant has been given a study code. One needs an attachment key or coupling key stored separately in another location than the study code to gain access to identifying participants. Key access is restricted to three researchers (the principal investigator and two research assistants). This is in line with current laws and regulations for data storage and handling, which state that health data must be stored in a de-identified form at a secure database, and if not stored in a secure location, it must be encrypted. For instance, if one wishes to share the data, it must be encrypted to secure anonymisation. I applied to the principal investigator, who granted me access to parts of the data material. The process involved two applications, one for paper II and one for paper III. In these contracts, the date for deletion of the data is specified. After my project period, all of the data must be transferred back to KORFOR for "cold storage" on the research server. How the data is stored has been communicated to the participants before they have given their consent, and they have also received feedback. Following the completion of data collection (31.12.2025), data will be curated and anonymized. All data will be anonymized by 31.12.2028 and stored for an additional five years. All data will be destroyed following these five years.

Issues concerning data sharing in the Stayer project include laws and regulations protecting the research participants, such as the Personal Information Act and the General Data Protection Regulation (GDPR). In the Stayer project, the Personal Information Act is followed by having

pseudo-anonymisation, which safeguards the participants' privacy. The GDPR is legislation that updated and unified data privacy laws across the European Union (EU) coming into force in May 2018. One important principle is *storage limitation* stating that personal data must be kept only as long as needed. This resonates with the REK guidelines, which emphasise a time limit when data must be destroyed.

In the Stayer project, the participants had the right to access personally identifiable health data about themselves and the security measures used in the project to process personal data as long as such access did not jeopardise security. This is in accordance with the Health Research Act (Health Research Act, 2008). The data that the research participants are granted access to must be in a format that is accessible to the individual, i.e. it must be written in a way which is understandable to the particular person at hand. The participants may demand that the project manager explain the data thoroughly to ensure that the participants can protect their interests. In the Stayer project, participants could retract their data from the dataset if they withdrew from the study, and if so, the data had to be deleted within 30 days.

The Stayer project aimed to conduct recovery analyses of cognitive, psychological, and social recovery processes related to changes in substance use among people with SUD. In this respect, the primary goals of the data collection are related to the goals of this thesis. However, some measures are more simplistic than others; e.g. the variable 'drug-free friends' is binary. As it is based on a "yes" and "no" answer from the participants it is possible that this variable is neither sensitive enough to capture associations with other variables in the dataset nor able to reflect supportive friendships. Dichotomous variables make it challenging to assess the type of friends the participants refer to and how often they meet, which probably influences recovery maintenance. This is a general challenge with dichotomous variables. However, these types of variables are frequently used in the SUD literature and may still give

insight into the problem at hand, but they contain limitations that must be discussed. I will discuss the limitations below.

Informed consent from the research participants is pivotal to a research study. Participation consent should be voluntary, informed, unambiguous, and documentable (NESH, 2022). The researcher has the responsibility to make sure that the participants have the capacity to give consent. This is essential for maintaining human dignity and privacy. The principle of consent revolves around ethical principles such as freedom of choice (voluntary), the duty to not mislead people (informed), clearly expressing participation (unambiguous dialogue), and emphasising the researcher's responsibility and securing the rights of the participants (documentable).

Participants' confidentiality and anonymisation are crucial to the collection of data and recruiting process, and a central part of the information participants are given when asked for informed consent. Confidentiality refers to the researcher's responsible handling of the data and the duty to not disseminating it in ways that violate this contract (NESH, 2022). In the Stayer project, participants were given prewritten information and a short description of the project during the first treatment session (1-3) by their counsellor. The counsellor then asked if a research staff member could make contact to get informed consent to participate in the study. If the patient accepted this, a research staff member phoned the patient and scheduled an appointment to obtain written informed consent. Patients were offered a compensation of NOK 400 for the annual testing and NOK 200 for quarterly sessions. This is regarded as compensation for lost income during testing and interview sessions. Upholding confidentiality agreements is essential to the researcher's credibility and the participant's trust in the research. In such situations, informing participants about exemptions from this obligation is crucial.

Ethical permission is essential in research to safeguard good scientific practice and protect research participants' interests, safety, and rights. Research involving human participants must be ethically approved before the study begins. This is important to protect human dignity, rights, safety, and well-being. However, it may also reflect preventive measures to reduce reiterating previous misdeeds in research, where respect for participants has been absent, i.e. the Dachau hypothermia experiments (where Jews were submerged in ice cold water to investigate how long they could survive) or the Tuskegee syphilis study (where treatment was withheld from African Americans). In these studies, participants were used *only* as a means to an end which deviates from Kant's humanity principle mentioned above and the Helsinki declaration stating that respect for persons should take precedence over the interests of science (and society). In science, research participants are used as a means to an end, such as increasing knowledge, and may sometimes be asked to take risks. It is, therefore, pivotal that we have ethical guidelines that safeguard their interests.

Researchers must follow particular laws and rules, e.g. the Health Research Act, international conventions (Nürnberg, Helsinki, Oviedo), and research committees (Norwegian Centre for Research Data, the Regional Committees for Medical and Health Research Ethics) to be able to do research on human beings. In Norway, research projects on human beings must be pre-approved by REK before starting.

To obtain ethical approval or permission, the researcher has demonstrated that s/he has adhered to the accepted ethical standards, rules, and laws of a genuine research study. Thus, when applying for permission in clinical studies, one must take into account participants' consent to participate in research and the legal requirements concerning the storage of personal data/data protection, but also access to and sharing of such data, and issues of confidentiality and anonymity mentioned above. In addition, I will mention issues related to vulnerable groups, direct involvement, and risk of harm and disadvantage. SUD

patients may be regarded as belonging to a vulnerable group. They often have poorer socio-economic status and a higher disease burden, such as a higher risk of contracting Covid-19 (Hiller-Sturmhoefel, 2021). In this respect, researchers have the responsibility to protect their interests and integrity, such as making sure that they do not experience pressure to consent to participation (e.g. monetary pressure) and do not have impaired capacity to consent (NESH, 2022). The participants in the Stayer project are directly involved and affected by the research; therefore, the researchers have a responsibility towards them. Furthermore, such involvement may also lead to participation bias that may impede the project results. For instance, participants may change their behaviour if they know that they are being watched. This is called the Hawthorne effect. If participants behave differently than usual, this reduces the validity of the study results. However, participants studied for a more extended period, such as in longitudinal studies, tend to habituate to being observed and, as a result, behave as they usually would. When studying human beings, researchers are responsible for ensuring that the participants are not exposed to harm and unreasonable disadvantage. In the Stayer project, I will suggest that one possible (although maybe not unreasonable) disadvantage was the quarterly follow-ups which may have been too demanding for some participants during the first two years of follow-up. However, some participants states this was not the case (Svendsen et al., 2020).

Service users have been involved in planning the Stayer-project, such as research design and monitoring, contributing to research questions and hypotheses, and data collection. In the Stayer project, providing feedback to the participants was relatively easy (Svendsen et al., 2017). Biweekly short messaging service (SMS) monitoring and regular phone calls helped retain the participants in the project. The participants also received reminders for appointments and flexible procedures for follow-up, and there was a focus on the early establishment of working alliances and providing individual follow-up adaptations to increase motivation

(Svendsen et al., 2017). Ongoing monitoring and feedback seem to have positively influenced the retention rate, i.e. potentially decreased drop-out rate.

Since the beginning of the Stayer project in 2012 to the present, there have been changes concerning some of the above-mentioned regulations and rules in Norway and the EU. One change affecting Norway and the EU is the new legislation following GDPR. However, GDPR did not affect the protocol with regard to informed consent. GDPR views pseudo-anonymisation differently than Norwegian law, i.e. it is stricter than in Norway. However, pseudo-anonymisation and encryption following Norwegian law are still regarded as safeguarding the participants, e.g. through the Health Research Act. The Stayer study's latest REK approval was received in January 2021 for the collection of data from 2022-2025.

8 Findings

8.1 Summary paper I

The title of the paper is "Is the relapse concept in studies of substance use disorders a 'one size fits all' concept? A systematic review of relapse operationalisations". *Relapse* is both a theoretical construct and an empirical object of inquiry. It is unclear how relapse is operationalised with regard to the various phases in SUD. The objective was to investigate *relapse* operationalisations in SUDs studies after short-term and long-term abstinence, and remission, recovery, and slip. We found that 89 out of 276 studies mentioned relapse but provided no definition of relapse. Moreover, 70% of the studies had a follow-up duration of less than two years. The remaining studies had either two or more years of follow-up. Our narrative analysis suggests that the operationalisations of abstinence, remission, recovery, relapse, and slip mainly focused on *time*, *use*, *diagnostic criteria*, *amount and frequency*, *psychosocial*, and *measure*. Moreover, there are different levels of detail in the operationalisations. Of the 16 studies with a follow-up duration of up to two years, one (six percent) contained a definition of 'long-term abstinence'. Of the 64 studies with a follow-up duration of more than two years, four (six percent) contained a definition of 'long-term abstinence'. Of those, one (two percent) mentioned 'early relapse', and one (two percent) mentioned 'late relapse'. We identified no consensus on *relapse* operationalisations nor agreement on the differentiation between early and late relapse. In this regard, the clinical utility of current relapse operationalisations seems low and may compromise knowledge accumulation about relapse and implementation of research into treatment. The paper was published in *Alcohol and Drug Review*.

8.2 Summary paper II

The title of the paper is "The predicting role of psychological functioning in remission and recovery in substance use disorder across 5 years."

Longitudinal studies on mechanisms and mediators in SUD recovery research are sparse, especially on psychological and social factors. Thus, knowledge of what psychological mechanisms support or impede the recovery processes is needed. The objective was to investigate the predicting role of psychological functioning in symptomatic remission and clinical recovery annually across five years. While psychological functioning did predict long-term stability in symptomatic remission over the long term, a significant loss of remission also occurred within the group with the greatest change in this domain. For instance, in year three, 23 out of 113 participants achieved remission, while in year five, there were nine. There was a similar relationship between psychological functioning and clinical recovery. Whereas 16 out of 113 participants obtained recovery in year three, 12 did in year four. In year five, three participants obtained recovery, but the result was non-significant. We obtained comparable results when investigating a one standard deviation improvement in psychological functioning from baseline to the fifth year. Six out of 45 obtained symptomatic remission, while three out of 45 obtained clinical recovery. Improvement in psychological functioning seems important to obtain recovery but insufficient to maintain SUD recovery across several years, suggesting that other functional and social aspects must be included to sustain recovery. *This paper is resubmitted.*

8.3 Summary paper III

The paper's title is "Changes in the trajectories of drug-free friendships and substance use among a cohort of individuals with multiple substance use disorders." Longitudinal studies of the association between polysubstance use disorder trajectories and alcohol- and drug use, debut age and gender are scares. The objectives were to investigate alcohol and drug use trajectories annually across four years, i.e. from first to fifth follow-up, and how such trajectories may be associated with drug-free relationships, gender, and debut age. The main finding is alcohol and drug use stability across four years, i.e. from first to fifth follow-up. Furthermore, drug-free friendships were fairly constant across four years

and did not affect alcohol and drug use in four of the five follow-ups. We found that neither gender nor debut age had any significant association with drug use trajectories. The paper discusses how the findings deviate from previous research on gender, debut age, and drug-free friendships. *This paper is in review.*

9 Discussion

The main objective of this thesis was to investigate some psychological and social factors in relapse after long-term abstinence (late relapse). To achieve this, we first completed a systematic review of how the SUD field operationalises relapse after short-term and long-term abstinence, remission, recovery, and slip or lapse. This provided us with an overview of how relapse has been operationalised during the various phases of substance use disorder and what the SUD field considers to be a late relapse. Second, we investigated the predicting role of psychological functioning in symptomatic remission and clinical recovery annually across five years. Third, we investigated alcohol and drug use trajectories annually across four years and their association with drug-free friendships, debut age, and gender. Taken together, we could say that the three studies relate to what Ian Hacking (1983) calls 'representing and intervening'. SUD science not only represents its scientific objects, such as theory and operationalisation of recovery and relapse but also uses these to intervene in the world through quantitative or qualitative experiments. Recovery and relapse are complex issues in SUD theory and science. What is evident from recent studies on these topics, is that broader social context has been neglected in SUD research. Furthermore, there is a lack of knowledge about recovery measures, mechanisms, and mediators. I will now discuss these issues in relation to the three papers. I will first discuss these issues on a *conceptual* level focusing on paper I. Second, I will address the experimental level focusing on papers II and III.

9.1. Conceptualisation of recovery and relapse

Although we investigated abstinence, remission, and slip/lapse in paper I, this part of the discussion will focus mostly on recovery and relapse, mainly because our review implies that there is no consistent use of 'late relapse' and 'recovery' which are core concepts in SUD research.

SUD recovery is characterised as a protracted developmental change process consisting of trajectories with different transitions and stages, such as early (< 1 year), sustained (1-5 years), and stable (> 5 years) recovery (Martinelli, van de Mheen, Best, Vanderplasschen, & Nagelhout, 2021). Presumably, this suggests that relapse may be different in early, sustained, and stable recovery stages as these phases involve different developmental change processes and transitions (Martinelli et al., 2020). However, our review suggests that SUD research largely does not distinguish between late and early relapse, consists of more short-term studies than long-term studies, and uses different operationalisations of the same key concepts to understand SUD relapse. This suggests that SUD research does not consistently integrate relapse with recovery.

Variation in operationalisations is not only a problem in SUD research

The variation in the operationalisation of key concepts may imply that SUD research does not agree on how to *represent* them. It may also indicate that the concepts are challenging to pinpoint due to their complexity. In the latter case, different operationalisations may imply different decisions on how to represent. We mention in our review that it may be a case of different levels of detail in operationalisations, such as in the representation of 'relapse.' Most of the operationalisations of relapse involve consumption of substance use. Based on this, we may claim that most of them overlap. Hence, the operationalisations are not incommensurable in terms of comparability. In this context, we may argue that the challenges presented by Hagger (2014) are common in the translation of scientific results into practice (Young & Borland, 2011) and not particular to SUD research (e.g. the same challenge exists in social psychology (Skinner, 1996) and neuropsychology (Barkley, 2014)). Nevertheless, different operationalisations of the same construct may make it more challenging to aggregate research findings, i.e. conducting traditional systematic reviews and meta-analyses.

Scientific studies operate in a different context than do practice and interventions. One may conjecture that science, to various degrees, removes contaminating factors to investigate relationships. Afterwards, if specific relationships are found, the task involves adding back contaminating factors (Fjelland, 2002). In our case, this recontamination would refer to the process of translating the findings into practice. Archie Cochrane mentioned a similar distinction when differentiating between efficacy and effectiveness (Berg, 2021). Efficacy refers to the scientific merits of a treatment, while effectiveness denotes the translation of scientific research into practice. Berg (2021) points out that whereas science reduces complexity, the reduction of complexity is in clinical practice related to the risk of suboptimal treatment services. This thesis suggests that relapse and recovery are dynamic and complex phenomena which are not easily conceptualised. Research reduces these phenomena in order to study them and may only capture some parts of the whole. Service providers should be aware of this reduction in research when they implement the findings in practice.

Moreover, the scarcity of long-term studies and limited focus on functional measures (Bjornestad et al., 2020) in SUD recovery research may have contributed to overlooking this complexity. A similar incident occurred in schizophrenia research and practice: As mentioned in section 3.2, Friesen (2019) argues that there was a narrow focus in schizophrenia recovery research focusing on symptoms rather than functional measures. Although these studies showed some efficacy, they generally had low effectiveness. After a while, it was recognised that one possible reason for low effectiveness was the research favouring symptom measures rather than functional ones. This realization, and that service-users expressed that recovery research focused on factors that were not relevant for their recovery, led to a change in focus.

The cyclic nature of SUD and the necessary inclusion of complexity

SUD is typically cyclical (Arria & McLellan, 2012; McKay & Hiller-Sturmhofel, 2011), and therefore remission, recovery, and relapse are

interrelated. This indicates that studies of relapse should include remission and recovery to highlight the nature of SUD. Paper II in this thesis shows that there is a difference between obtaining symptomatic remission and clinical recovery. Although we found that improved psychological functioning aids remission and recovery, it was insufficient to maintain recovery across five years. Paper I finds that some of the operationalisations of remission and recovery presume that abstinence is the primary goal. Such operationalisations appear not to consider that SUD is often a cyclic process (McKay & Hiller-Sturmhöfel, 2011). Thus, it may be that such operationalisations reduce the complexity of the phenomenon too much, in the sense that abstinence gets more focus compared to other aspects of remission and recovery. Even though SUD research should reduce complexity, such reduction may pulverise the phenomenon and possibly narrow representation. In such instances, it becomes crucial to include theory and previous research to contextualise findings.

SUD research, it seems, should to a higher degree juxtapose the importance of personal (Davidson et al., 2007a; Leamy et al., 2011) and social (Price-Robertson et al., 2017) functioning in recovery research and the challenge of reducing these concepts in order to measure them. In summary, the operationalisations of remission and recovery do not adequately reflect that they are long-term processes, including profound behavioural changes across different life domains. As with 'relapse,' they seem to mostly favour abstinence, but not the contextual dimension.

Relapse is a change point and not an end outcome

Paper I highlights that relapse is part of a dynamic change process. Relapse is a matter of problematic patterns of substance use, not a matter of returning to any use of a substance whatsoever. However, addiction research has not properly distinguished between relapse as a dynamic rather than static event (Chung & Maisto, 2006; Maisto et al., 2016). If a relapse is mostly understood as a discrete outcome, i.e. any substance use, it overlooks how common relapse is in SUD recovery (Miller, 1996).

Conceptualising 'relapse' in a binary fashion might substantiate 'relapse' as a static phenomenon that is the same whenever it happens in recovery and that recovery is about abstinence. Several studies indicate that abstinence or being symptom-free is not the sole criteria, maybe even not necessary, for recovery (Friesen, 2019; Witkiewitz et al., 2020; Witkiewitz & Tucker, 2020; Witkiewitz et al., 2019). A binary conceptualisation hides that 'relapse' is a dynamic phenomenon influenced by the duration of abstinence and behavioural changes. Thus, a relapse is influenced by when it happens in the recovery process (Martinelli et al., 2020). A central implication of this realization is that it may be necessary for SUD recovery research to acknowledge that relapse is part of the SUD cycle and an integral part of recovery. Hence, rather than reaching a consensus on relapse operationalisation, although higher agreement on defining relapse is warranted, the focus should be an increased focus on integrating recovery measures with substance use measures and viewing relapse as a clinical marker representing a change point.

Late relapse or just 'relapse'

Our systematic review found neither evidence of differentiation between early and late relapse nor consensus on relapse operationalisation. Additionally, there were fewer long-term than short-term studies, implying that the knowledge base on recovery extending two years is scarce compared to the knowledge on short-term recovery. Furthermore, the lack of differentiation of when relapse happens in the recovery process seems to imply that relapse is a static phenomenon, while research suggests that it is dynamic (Chung & Maisto, 2006; Maisto et al., 2016; Miller, 1996).

As mentioned above, SUD research rarely uses recovery measures in longitudinal studies (Bjornestad et al., 2020). This may indicate that relapse and recovery stages are not integrated, i.e. understood as events that are related to each other. If SUD research uses both recovery and substance use measures, it may be easier to incorporate recovery stages

(Martinelli et al., 2020) and relapse, i.e. early (< 1 year), intermediate (1-5 years), and late relapse (> 5 years). Differentiating between relapses may make it possible to construct phase-specific treatments depending on when relapse happens in recovery. Moreover, it may provide the necessary framework for SUD research to focus on specific mechanisms and mediators in the recovery stages.

9.2 The social context in SUD recovery

In section 9.1, I discussed how science reduces complexity. Papers II and III are examples of this. It is therefore of vital importance to discuss them in relation to a larger context in order to ensure that the findings are interpreted contextually and in order to handle contaminating factors that are added back in the process of translation from research to practice.

Recovery occurs in a larger context suffusing individuality

As already argued, SUD recovery involves other factors than substance use, including changes in social and professional functioning and other life domains (Martinelli et al., 2020; White, 2009). Moreover, SUD is embedded in a larger social context (Price-Robertson et al., 2017) involving places, materialities, social living conditions, and social relations (Alegría et al., 2018; Doroud, Fossey, & Fortune, 2018; Larsen et al., 2021; Mezzina et al., 2006; Topor et al., 2022; Topor, Borg, Di Girolamo, & Davidson, 2011; World Health Organization, 2017). Previous research has shown that personal and social functioning measures are related to stable outcomes in recovery (McKay, 2017; Slade et al., 2012; Sobell, Ellingstad, & Sobell, 2000; Tiffany et al., 2012).

The findings in paper II suggest that improvement in psychological functioning is associated with obtaining clinical recovery and maintaining it over five years. This is in line with previous research stating that improvement in psychological functioning reduces the risk of relapse (Andreas et al., 2015; Booth et al., 2010; Erga et al., 2020;

Grella & Shi, 2011). However, there is an annual decline in recovery. Our findings do not suggest that improvement in psychological functioning is associated with clinical recovery maintenance (Mericle et al., 2014; Polcin et al., 2016) over time. Although improvement in psychological functioning may be associated with short-term clinical recovery (Johannessen et al., 2019), our findings suggest that this is not the case for long-term clinical recovery. Indirectly, our findings indicate that other factors are relevant to obtaining and maintaining recovery (since not all participants attained nor sustained recovery). It could also be the case that the association between psychological functioning, substance reduction, having drug-free friends, and employment or having other meaningful activities influence each other in ways that are not detectable in our analyses. For instance, in paper III, drug-free friendships do not seem to influence substance use reduction. This may be due to the measure being dichotomous, and therefore it may not be sufficiently sensitive. However, in our operationalisation of recovery in paper II, we presume that having drug-free friends influences the participants' recovery process, which may not be the case.

In line with previous research (Sobell et al., 2000; White, 2007), our results substantiate the claim that the temporal criterion in recovery should be longer than two years. The annual decline of recovery across five years may suggest the need for longitudinal research extending two years, including personal and social mechanisms and mediators. This is in line with current SUD research (Vanderplasschen & Best, 2021). Our study is narrow in the sense that it focuses on psychological functioning and clinical recovery. As mentioned above, these concepts are highly complex. For instance, our study does not include how people with SUD are often marginalised and suffer from social inequality (Room, 2005). In general, studies show that social determinants influence health and mental health (Alegría et al., 2018; Ramon, 2018; World Health Organization, 2017) and that the need for mattering is essential to the

quality of life and health (Prilleltensky, 2020). Presumably, these social factors influence recovery.

"Friends have no influence?"

The results in paper III are surprising given that they are mostly contrary to all we know about positive social recovery factors. As stated above, social support seems to be essential to recovery (Ellis et al., 2004; McKay, 2017; Ness et al., 2014; Nesvåg & McKay, 2018; Nordfjærn, 2011; van Melick et al., 2013; Vigdal et al., 2022; Weisner et al., 2003). Previous research has typically indicated either a positive, negative, or mixed association between drug-free friendships and recovery (McCrady, 2004). It seems that friendships did not influence the alcohol and substance use of the participants in our study. Generally, research suggests that positive drug-free friendships facilitate recovery maintenance (Lookatch et al., 2019), while having unsupportive drug-free friends deteriorate recovery (Dennis et al., 2007; Groh et al., 2008). Thus, there is good reason to include supportive social networks in the aiding of SUD recovery (Martinelli et al., 2021).

Interviews with individuals from the Stayer study who had been in recovery for two years or more suggested that family and friends played a key role in their recovery (Veseth et al., 2019). Based on this knowledge, treatment services should try to include supportive social networks, (re)establish positive relations with friends and family and try to facilitate such a social foundation in a long-term perspective. However, they should be aware that some friendships may not aid recovery. Treatment may use RC as a theoretical framework to highlight recovery assets in personal, social, and community domains. For instance, economic resources may be important for SUD recovery as poverty is linked to poor mental health (Ramon, 2018). Additionally, social isolation is related to poverty (Topor et al., 2022). This means that the three domains should be distinguished in order to divide recovery

into more manageable parts, but that they should not be regarded in isolation.

Long-term follow-up and treatment and welfare

Acknowledging these social factors and considering SUD as a long-term disorder have implications for SUD research, treatment, and health and welfare services. As I have already discussed the implications for SUD research, I will here focus on treatment and welfare. SUD treatment and health services should provide long-term follow-up focusing on psychological functioning and other social factors, such as supportive friends and networks, employment, meaningful activities, places, and materialities. Social equality (social determinants) should also be addressed as their impact on well-being and mental health is evident (Di Martino & Prilleltensky, 2020). This will potentially mitigate psychiatrisation (Topor et al., 2022) as recovery is placed in a larger context.

Such a focus is an opportunity to teach SUD patients about what contributes to citizenship, and how treatment and service providers may contribute to SUD patients obtaining them. For instance, are civil, political, and social rights equally attainable for SUD patients as they are for others? Moreover, people need to feel valued and add value, and experience belonging in society (Prilleltensky, 2020; Quinn et al., 2020). It may be that including this knowledge in SUD recovery underscores how important relationships and social environment are for recovery, as it is for any individual's well-being and health (Von Heimburg & Ness, 2021).

Gender does matter in SUD recovery

There is a paucity of SUD recovery studies focusing on gender differences (Kougiali, Pytlik, & Soar, 2021; Van Steenberghe, Vanderplasschen, Bellaert, & De Maeyer, 2021). Collinson and Hall (2021) seek to fill this knowledge gap. They consider recovery to be a

socially mediated process and claim that gender is a central mediator in SUD, showing that women and men are likely to have different recovery mechanisms and mediators. Research has found differences between men and women in terms of mental health and relational needs suggesting the need for gender-specific recovery interventions (Andersson, Wincup, Best, & Irving, 2021). Moreover, females are more likely to maintain abstinence over five to eight years compared to men (Dennis et al., 2007; Weisner et al., 2003). It is therefore interesting that we did not find gender differences in alcohol and drug use trajectories in paper III. Our finding implies that gender may not influence alcohol and drug use trajectories. Hence, there may be equal opportunities for both genders to achieve recovery. However, previous research shows that females have lower risks of relapse after recovery than men (Grella, Scott, Foss, & Dennis, 2008) and that there is a gender difference in substance use levels (Riley, Hempel, & Clasen, 2018; Salom, Betts, Williams, Najman, & Alati, 2016; Zakiniaeiz & Potenza, 2018). Consequently, there seems to be evidence for recommending treatment interventions that take gender into account.

9.3 Summary

Papers II and III in this thesis suggests that there is no explicit (single) dependent variable affecting recovery and remission. This is also the case in previous research – paper I found that conceptualisations of key concepts vary, and there is no real consensus in research operationalisations; there is a scarcity in longitudinal research focusing on personal and social functioning. This adds to the theoretical literature on recovery, RC, and remission, as various definitions of critical concepts may make conceptual development challenging. Fewer longitudinal studies suggest a knowledge gap with regard to what increases the likelihood of recovery, what types of RC are relevant to the different phases of recovery, and whether they differ from remission. Lastly, there is a lack of knowledge about the interaction between

functional measures and recovery and how RC may be related to this process.

In section 9.1 *Conceptualisation of recovery and relapse*, I discussed the implications of the lack of consensus on the definition of recovery and remission in SUD research and treatment. Limited consensus may influence RC conceptualisation. For instance, the field does not consistently integrate relapse with recovery, which may make it challenging to know the strengths and barriers to RC, such as what prevents relapse in the different recovery phases, but more positively, what advances recovery. Moreover, various operationalisations of recovery and remission may make it more challenging to develop RC concepts such as personal and social capital. Additionally, a scarcity of longitudinal research limits our knowledge of which RC components are relevant to long-term recovery.

This thesis further implies that being remitted for 12 months appears to be no guarantee for obtaining and maintaining recovery. Previous research suggests that recovery lasts for several years. This thesis supports this finding and emphasises that functional measures are a critical part of recovery and, thus, remission. Hence, this thesis suggests that it may be helpful to implement functional measures in treatment to track remission progress.

The findings from papers II and III emphasise that recovery and remission are complex, i.e. there is no single dependent variable for obtaining and maintaining recovery. This influences RC since it indicates that several key components must be present to facilitate recovery. For example, paper II suggests that psychological functioning aids recovery and seems to increase the chance of recovery. However, more aspects than psychological functioning alone appears to be needed. Other resources may be necessary, e.g. accessibility to recovery centres, reduced stigma, and positive social networks, for obtaining and

maintaining recovery. Consequently, my findings suggest that improvement in psychological functioning may be a form of personal capital (for some people but not all). Results from paper III indicate that drug-free friendships may not be as an important form of social capital (for some people but not all), which is contrary to the findings of previous research. My papers do not elaborate on how community capital may have influenced the results.

10 Strengths and limitations

Strengths

There are two notable strengths to this project. First, the systematic review's detailed field description of operationalisations, the amount of short-term versus long-term studies, and the representations of early and late relapse. Paper I emphasises that operationalisations vary. Knowledge about this variation is essential for traditional systematic reviews and meta-analyses as they often deal with numbers and not definitions. Hence, our review may provide a background for interpreting possible discrepancies in accumulating research on abstinence, relapse, remission, recovery, and slip or lapse. Furthermore, it highlights the need for more long-term studies. We argue for the possibility of differentiating between early and late relapse in terms of recovery research and theory and other research emphasising that relapse in early recovery may differ from later relapses. Second, the quantitative studies are based on one of the few longitudinal datasets with more than a two-year annual follow-up on psychological and social variables and SUD and gender. In this respect, this thesis adds knowledge to SUD recovery mechanisms and mediators, which is highly needed according to previous research (Bjornestad et al., 2020; Vanderplasschen & Best, 2021).

Limitations

In the systematic review, some operationalisations may have been missed. Further, each operationalisation was analysed using narrative synthesis, which has methodological and conceptual limitations. Methodologically, the emerging themes represents only one out of several possible ways of grouping the operationalisations. Hence, replicating the tabulation of operationalisations might result in different themes. Conceptually, the synthesis was an empirical and descriptive

investigation, not theory-driven, which might complicate applying the results for theory building.

In both of the quantitative studies, the sample size is a limitation. However, McNeish (2019) argues that small samples are common in most longitudinal research due to logistical and financial constraints when following individuals for an extended period. However, because of the small sample, we had to resort to counting for parts of our analyses in paper II. We also used bag imputation, which has limitations in line with other imputation methods. The lack of specificity in the phrase 'having other meaningful activity' and the fact that the self-report questionnaires used in this study have not been validated are both potential weaknesses. We neither know if the same individuals obtained recovery each year nor the exact numeric reduction represented by one standard deviation. As this study used dichotomous variables to assess clinical recovery, we cannot be certain which variables were answered 'no' or 'yes' to for symptomatic and functional remission. Thus, we cannot infer from our results which parts of clinical recovery participants did not attain. The participants may only have relapsed, yet they were in functional remission; they may have attained symptomatic but not functional remission or scored 'no' on both symptomatic and functional remission.

In paper III, our alcohol and drug use measures only yielded sum scores. The variable 'drug-free friendships' is dichotomous and does not yield information about the frequency and quality of drug-free friendships and participants' friendship assessments. Thus, the measure may not be sufficiently sensitive, which may be indicated by the high scores in the cross-sectional analysis. Furthermore, the findings are based on a small dataset, and perhaps a more extensive dataset would yield one or more significant associations between SUD and drug-free friendships. The results may also be due to minor variations in SUD and drug-free friendships, both at initial levels and in development. We have limited

information about the participants' diagnostic assessment. Thus, we have limited information about the number of SUDs and the types of SUD they had. Our assessment of participants' PSUD is based on their AUDIT and DUDIT scores showing that they use more than one substance. However, our assessment is not based on the initial diagnostic evaluation, which is a drawback.

Longitudinal cohort studies on recovery may have shortcomings concerning the creation of variables, controlling for comorbidity, and length and type of treatment. The studies in this thesis are no exception. The outcome variables are created from the accessible data, not from definitions of the outcome variables made in advance. These variables might have represented the phenomenon better if they had been created from theoretical definitions. However, how to represent a phenomenon is a general problem for science (Canguilhem, 2000; Hacking, 1983). Furthermore, the chosen variables are assessed as relevant for recovery, both prior to the announcement of this PhD project and afterwards, preparing for statistical analyses.

There is a lack of consensus of what constitutes recovery (see paper I), which may be a challenge to establishing definitions beforehand. It may be argued that the use of predefined variables to assess clinical recovery is common in recovery research, i.e. using indirect measures or defining phenomena or concepts differently (Liberman & Kopelowicz, 2005; Slade et al., 2012). Thus, my clinical recovery variable does not stand out compared to previous research.

SUD patients tend to suffer from psychiatric and somatic comorbidity that may affect their ability to obtain and maintain recovery (Moe & Berg, 2022). As I neither controlled for psychiatric comorbidity, somatic diseases, nor genetic risk, as such information was unavailable, these parameters may have influenced my results.

The length of stay in SUD treatment (e.g. 12 months) has been associated with better treatment outcomes compared to patients who are in treatment for a shorter period (at 12 months follow-up) (Proctor & Herschman, 2014). Similar results are found for self-help groups or continuing care regarding abstinence. Higher attendance in self-help groups from the sixth to the twenty-fourth-month follow-up showed higher abstinence rates than those attending less frequently (Proctor & Herschman, 2014). As these variables were not included in my studies, I do not know to which degree they may have influenced my findings.

Although we cannot make firm conclusions, which is common in the social sciences, the analyses done in this thesis are good enough to generate hypotheses about recovery.

11 Implications for research and practice

As argued above, the different operationalisations may make it challenging to accumulate knowledge of the same construct since different terminology has been used to address similar phenomena (Hagger, 2014). However, this concerns most research fields (e.g. social psychology) and not SUD research in particular. The findings in paper I also suggest that relapse is viewed as a static phenomenon rather than as a part of a change process. Arguably, then, 'relapse' may not be integrated with the SUD cycle and recovery literature. This means that research risks neglecting that different stages of recovery may be related to different reasons for relapsing beyond substance use. It is a commonsensical assumption that being recovered for one year probably entails fewer changes across different life domains than being recovered for two years (see paper I for details). Even though recovery is a non-linear process, this may imply that different treatment interventions should be used depending on when one relapses. The narrow focus on abstinence makes it hard to take into account how common relapse actually is, and that relapsing is dependent on when it happens. Thus, relapse, remission, and recovery cannot be assessed primarily from substance use, and assessment should also take into account the gradual and different behavioural changes.

The two quantitative studies indicate that long-term research extending over two years is necessary in order to depict the recovery process. Moreover, several recovery measures should be integrated, such as personal, social, and community measures. In paper III, the stability in alcohol and drug use trajectories across four years underline the need for more longitudinal research. A similar conclusion has been drawn in previous research, demonstrating that reduction in use takes several years (Dennis & Scott, 2007; Dennis, Scott, Funk, & Foss, 2005; Heyman, 2013). Higher temporal resolution between follow-ups may also prove to be useful. It may be opportune to investigate the frequency and quality

of drug-free friendships, participant friendship assessment – including what study participants associate with having a friend – and whether the friendships are beneficial, detrimental, or both to participants' recovery.

Inevitably, these future research recommendations have implications for treatment in the sense that treatment should involve these three dimensions. Our findings suggest that it is simply not enough to rely on improved psychological functioning to obtain and maintain recovery. Thus, our results corroborate the need for comprehensive continuing care in SUD treatment (McLellan et al., 2000; McLellan, McKay, Forman, Cacciola, & Kemp, 2005; Nesvåg & McKay, 2018). Although our study suggests that treatment interventions that improve psychological functioning may be necessary to aid clinical recovery maintenance, it is by no means sufficient to maintain recovery across five years. This seems to imply that SUD treatment should include other treatment interventions, such as achieving employment/education and getting greater access to enjoyable or rewarding activities (Crutchfield & Guss, 2019; McKay, 2017). One may question to what degree functional remission promotes symptomatic remission. It may be the case that other features of the participants' community and social environment were of more importance, such as socioeconomic position, social capital, social justice, their experience of feeling valued and adding value to others, the self, work and the community (Alegría et al., 2018; Di Martino & Prilleltensky, 2020; Prilleltensky, 2020; World Health Organization, 2017).

In paper III, the stability in alcohol and drug use trajectories may suggest a need for long-term follow-up to reduce alcohol and drug use gradually over several years. This seems to be in agreement with previous research showing that alcohol and drug use reduction and abstinence takes many years (Dennis & Scott, 2007; Dennis et al., 2005; Heyman, 2013). Thus, the stability in alcohol and drug use, and not increasing recovery periods, suggests that planned and regular long-term follow-up including

systematic assessments by treatment professionals may be beneficial (Arria & McLellan, 2012; Mertens, Flisher, Satre, & Weisner, 2008; Moe & Berg, 2022).

Our findings suggestively indicate that interventions other than drug-free friendships may be more relevant to facilitating recovery, such as employment or social networks (Ellis et al., 2004; McKay, 2017; Ness et al., 2014; Nesvåg & McKay, 2018; Nordfjærn, 2011; van Melick et al., 2013; Vigdal et al., 2022; Weisner et al., 2003). However, the literature suggests that drug-free friendships may be positive, negative or mixed (McCrady, 2004). More research than our study is needed before any definite conclusion on excluding drug-free friendships can be drawn, insofar as our results seem counterintuitive given previous research showing positive effects (see section 10 under *Limitations*). We suggest a similar conclusion for our results on debut age and gender. Studies suggest a relationship between gender and recovery, and that debut age is associated with adverse health-related and social outcomes. Consequently, SUD health services should probably focus on these factors in treatment.

12 Concluding remarks

Using a systematic review as a point of departure for the two subsequent studies was beneficial as it provided a sound foundation for the current knowledge base on relapse after long-term abstinence before conducting them. The review revealed that there is no differentiation between types of relapses, which may as such indicate that the recovery literature is not integrated into SUD research. Taken together with the finding that there are fewer long-term than short-term studies, this conjecture seems plausible. Furthermore, the review findings suggest that abstinence is favoured in operationalisations of relapse, remission, and recovery, which seems to disregard personal and social functioning and community factors. In summary, operationalisations of key concepts are inconsistent and knowledge about late relapse is scarce.

Our study on psychological functioning shows that improvement in this domain is important to obtain recovery but not sufficient to maintain it. We therefore argue that other social and municipal factors should be included. Additionally, we discuss the importance of social justice, equality, and mattering in relation to quality of life in SUD research and practice. This has been shown to be important for most human beings.

Our findings on gender, debut age, and drug-free friendships were contrary to previous research. In particular, our findings on gender and drug-free friendships appear to go in the other direction than both previous and current research and literature. Thus, we believe these findings warrant more research. The findings seem counterintuitive when considering how essential social relations are to humans and that gender may play a significant role in our preferences and needs.

This thesis is rooted in the perspective that humans are bodily and social beings living in a material and social world (Fjelland, 2020). We need others to survive and flourish in our everyday life. Caring and supportive relationships are essential for health and well-being (Von Heimburg &

Ness, 2021). Human beings are understood through a social context – in their relation to others and to their surroundings. This means that I in this thesis uphold a methodological collectivist stance which advocate that individuals do not exist as independent subjects independent of their contexts. Conversely, a methodological individualist would claim that social phenomena must be explained from individuals' actions alone or their rationality.

In the recovery literature and evidence, reduction in core symptoms is seen as expedient to recovery. However, there are few long-term studies extending two years on psychological and social factors. This thesis addresses this knowledge gap by investigating the psychological and social factors mentioned above in relation to late relapse, i.e. relapse happening after two years or more, in order to attain knowledge about recovery processes. Since there is less research on these recovery processes, we need valid and evidence-based knowledge on why some people experience late relapse while others do not. What are the differences and how may they increase or reduce relapse risk, quality of life, and functioning?

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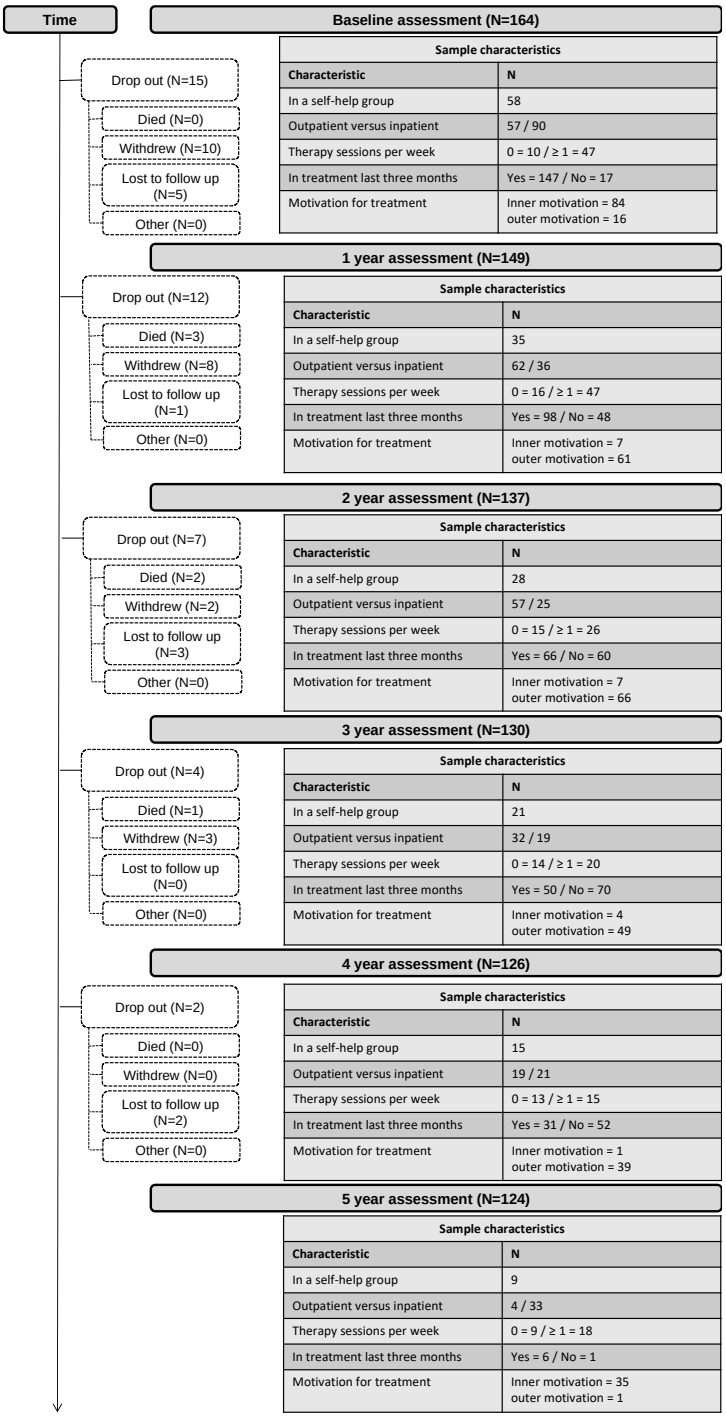
14 Figure 1 – flow chart

Figure 1 – flow chart



15 Papers

Drug and Alcohol REVIEW

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COMPREHENSIVE REVIEW

Is the relapse concept in studies of substance use disorders a 'one size fits all' concept? A systematic review of relapse operationalisations

FREDRIK D. MOE[1], CHRISTIAN MOLTU[2], JAMES R. McKAY[3,4,5], SVERRE NESVÅG[5,6] & JONE BJORNESTAD[1,2,7]

[1]Department of Social Studies, Faculty of Social Sciences, University of Stavanger, Stavanger, Norway, [2]Department of Psychiatry, District General Hospital of Førde, Førde, Norway, [3]Department of Psychiatry, Perelman School of Medicine, University of Pennsylvania, Philadelphia, USA, [4]Philadelphia VA Medical Center, Philadelphia, USA, [5]Centre for Alcohol and Drug Research, Stavanger University Hospital, Stavanger, Norway, [6]Department of Public Health, Faculty of Health, University of Stavanger, Stavanger, Norway, and [7]TIPS—Network for Clinical Research in Psychosis, Stavanger University Hospital, Stavanger, Norway

Abstract

Issues. *Relapse is a theoretical construct and empirical object of inquiry. It is unclear how relapse is operationalised with regard to the various phases in substance use disorders (SUD). The aim was to investigate relapse operationalisations in SUDs studies after short- and long-term abstinence and remission, recovery and slip/lapse.* ***Approach.*** *Systematic review using the following databases: Epistemonikos, Cochrane Central Register of Controlled Trials (CENTRAL and DARE), MEDLINE, EMBASE, Google Scholar, CINAHL, Web of Science and PsycINFO. Search returned 3426 articles, with 276 meeting the following inclusion criteria: empirical study published in English in a peer-reviewed journal; samples meet diagnostic criteria for dependence syndrome or moderate–severe drug use disorder or alcohol use disorder; reports relapse, abstinence, recovery, remission, slip or lapse. Review protocol registration: PROSPERO (CRD42020154062).* ***Key Findings.*** *Thirty-two percent of the studies had no definition of 'relapse'. Most relapse operationalisations were defined according to measure (26%), time (17%), use (26%) and amount and frequency (27%). Of the 16 studies with a follow-up duration of up to 2 years, one (6%) contained a definition of 'long-term abstinence'. Of the 64 studies with a follow-up duration of more than 2 years, four (6%) contained a definition of 'long-term abstinence'. Of those, one (2%) mentioned 'early relapse' and one (2%) mentioned 'late relapse'.* ***Implications.*** *Future research is needed to explore the possible difference between early and late relapse. Moreover, working to increase consensus on relapse operationalisations in SUD research is warranted.* ***Conclusions.*** *We identified no consensus on relapse operationalisations nor agreement on the differentiation between early and late relapse. The clinical utility of current relapse operationalisations seems low and may compromise knowledge accumulation about relapse and implementation of research into treatment.* [Moe FD, Moltu C, McKay JR, Nesvåg S, Bjornestad J. Is the relapse concept in studies of substance use disorders a 'one size fits all' concept? A systematic review of relapse operationalisations. *Drug Alcohol Rev* 2021]

Key words: systematic review, substance use disorder, relapse, long-term abstinence, recovery.

Introduction

Substance use disorder (SUD) is most often defined as a chronic illness [1,2] involving a common repeating cycle of abstinence and relapse [3]. 'Relapse' refers to a return to a previous level of substance use after a period of considerable reduction or abstinence from substance use.

Miller [4] argues that the dichotomous classification of abstinence and relapse is too simple for such complex phenomena. He shows that the definition of the 'relapse' concept is elusive and does not adequately reflect how behaviour change occurs in SUD. For example, research shows that recovery and remission include periods of abstinence with gradual

Fredrik D. Moe PhD Fellow, Christian Moltu PhD, Professor, James R. McKay PhD, Professor, Sverre Nesvåg PhD, Head of Research, Professor II, Jone Bjornestad PhD, Professor. Correspondence to: Mr Fredrik Moe, Department of Social Studies, Faculty of Social Sciences, University of Stavanger, PO Box 8600 FORUS, 4036 Stavanger, Norway. Tel: +47 4679 1163; E-mail: fredrik.d.moe@uis.no

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improvement in substance use and other psychosocial areas [4,5]; where periods of substance use and abstinence are common (for some people but not all). Thus, a binary distinction between abstinence and relapse does not capture that recovery is an ongoing dynamic behaviour change process, including diverse pathways, to attain and maintain recovery [6]. In this regard, Miller [4] shows how the 'relapse' concept is related to recovery and remission, and in turn, they are dynamic phenomena rather than static. Likewise, a *common* definition of relapse might be challenging to pinpoint, and thus specific definitions might be more useful. For example, a relapse might differ depending on the type of substance misuse, population characteristics and context. Additionally, a binary definition of relapse may leave out the subtle difference between a relapse and a slipe or lapse, that is, a minor set-back not as severe as a relapse.

Moreover, research on relapse, remission and recovery, both in SUD and in related fields, demonstrates that there is a plausible difference in causal factors between early and late relapse. In the long term, positive changes in functioning, including social and professional functioning, as well as a sense of community belonging and identity change, are more protracted processes than symptomatic relief or symptomatic remission [7–10]. Research by Martinelli *et al.* [11] shows that recovery is a gradual, long-term process that includes distinct phases involving various life domains beyond abstinence. Such results indicate that recovery is an ongoing dynamic process of behavioural change [6]. Individuals in long-term recovery typically have fewer problems related to housing, criminality and substance use, and they are more likely to have work or attend education than individuals early in recovery [11]. Thus, late relapse plausibly involves other challenges in social behaviours and functioning compared to early relapse. Further, studies on first-year abstinence suggest that cognitive functioning and learning ability are significantly reduced during the first year of abstinence, likely making these factors more prominent in early relapse [12,13]. Moreover, the early physical demands induced by symptoms of withdrawal [14] and the need for change in nutrition and physical exercise are more prominent in early relapse [15]. Hence, early relapse will plausibly involve reduced cognitive and physical capacity. In sum, these findings underscore that early and late relapses seem related to different life domains and are hence different phenomena.

Relapse after short-term abstinence (hereafter: early relapse) is associated with depressive emotions, mental illness, unemployment and lack of social support [16–18]. Relapse after extended abstinence (hereafter: late relapse) is associated with the use of avoidant coping style, low self-efficacy and not considering problematic substance use as a problem [19].

However, there is no consensus on operationalisations of relapse [9], nor on the application of time criteria. For early relapse, some studies used 2–6 months [17] while others used 3–12 months [16]. For late relapse, some studies used 18 months [20] while others used 3 years [19]. Hence, the existing literature makes it difficult to determine whether a relapse is in fact early or late.

Previous research [21] suggests that the concept of relapse in alcohol use disorder (AUD) has low heuristic value because it is operationalised differently in different studies. A suggested solution to this problem is to define 'relapse' as an absence of abstinence [22]. However, a too narrow or too broad definition of 'relapse' may hide phase-specific needs and challenges during the course of recovery and thus make it more difficult to implement well-timed and tailored treatment efforts. Furthermore, without a coherent operationalisation of relapse, there will be a risk that the phenomenon is inadequately represented, which makes it difficult to compare study results and implementing relapse prevention. Such risk bears similarities to what Hagger [23] denotes as the 'déjà-variable' phenomenon and the 'jingle' fallacy. When these concepts are taken together, they refer to the presumption that the same construct has similar meaning across studies when, in fact, different terminology has been applied to the same construct. This might lead reviewers to conclude that findings of relapse are inconsistent when, in fact, it is due to inconsistent terminology.

Aim

The aim of this study is to systematically review operationalisations of relapse after short-term and long-term abstinence and remission, recovery and slip.

Method

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines [24–26]. The protocol was registered in the International Prospective Register of Systematic Reviews (PROSPERO) in October 2019 (registration number: CRD42020154062) (Appendix 1).

Search strategy

Two researchers (FM and JB) independently searched the literature using the following databases: Epistemonikos, Cochrane Central Register of Controlled

Trials (CENTRAL and DARE), MEDLINE, EMBASE, Google Scholar, CINAHL, Web of Science and PsycINFO. Variations and combinations of terms targeting five main concepts were used in the search: relapse, abstinence, remission, recovery and slip (See Appendix 2 for model search). An information scientist reviewed the search queries and safeguarded that the literature search was conducted correctly. A manual literature search was also performed using reference lists of reviews and meta-analyses identified in the main search. In cases of doubt, the full-text paper was read to determine eligibility. There was no time limit for the included studies. The last search was conducted on 8 January 2021.

Eligibility criteria

The included articles had to meet all of the following criteria:

1. Empirical study published in English in peer-reviewed journals.
2. Study sample meets diagnostic criteria for dependence syndrome in International Classification of Diseases, 10th revision [27], dependence syndrome in Diagnostic and Statistical Manual of Mental Disorders (DSM) IV [28], or moderate–severe drug use disorder or AUD in DSM-5 [29].
3. Reports relapse, abstinence, recovery, remission, short- or long-term, slip or lapse.

Exclusion criteria

1. Studies reporting on smoking or smoking and alcohol/AUD only.
2. Animal studies.
3. Case studies.

Data collection

All potential studies were exported into a reference citation manager (Endnote) before duplicates were removed. Two reviewers (FDM and JB) independently performed the screening of titles and abstracts and full-text analysis. In cases of doubt, the full-text paper was read to determine eligibility. The synthesis of the operationalisations (Table 1) and selection of outcomes were developed during 11 consensus meetings. Disagreements were resolved through discussion until consensus was reached. A third reviewer (JRM) was available to resolve disagreements and provide critical feedback.

Analytic methods and data extraction procedure

A narrative synthesis was performed for the included articles. A narrative synthesis is a textual approach seeking to 'tell a story' about the findings from the included studies focusing on questions beyond the effectiveness of a particular treatment [30]. The purpose was to assess different levels of detail in operationalisations and discuss the implications of comparing and implementing studies deploying different operationalisations of the same concepts. We aimed to use this analytic approach for mapping the diversity in the field. Hence, the synthesis focused on the separate elements building up the whole of the empirically based operationalisation.

The first step for each included article was to assess sample description and substance type; length of follow-up; study aim; frequency of measuring points; operationalisations of abstinence, remission, recovery, relapse and slip; measuring instruments and other relevant information for relapse assessment. The second step was to tabulate the articles' primary findings, focusing on the operationalisations of abstinence, remission, recovery, relapse and slip. In step 3, we conducted a step-by-step thematic classification of each of the five groups of operationalisations, and operationalisations were subdivided into separate categories/themes based on similarity; for example, every operationalisation of *relapse* that primarily used urine analysis, breathalyser or blood sample to assess relapse was grouped under the theme 'biomarker'. In step 4, we grouped themes from step three into overarching themes. Thus, operationalisations of relapse that used biomarkers or other measuring instruments, such as Drug Use Disorder Identification Test or Alcohol Use Disorder Identification Test, were grouped together under the overarching theme *measure*. The rationale was that *measuring* was a primary theme in the operationalisation of relapse (see Limitations for further elaboration).

Since each operationalisation was divided into several themes, the result was more themes than operationalisations. For example, *relapse* operationalisations often contained different time criteria and use criteria for assessing a relapse, and these criteria were subdivided into separate themes. This process led to several themes of both time criteria and use criteria. For example, when grouping time criteria together, we assessed similarity in length. Further, we determined which subdivided themes were more frequent than others. As there were several subdivided themes relating to time, time was chosen as an overarching theme, based upon agreed similarities. The rationale for subcategorising the operationalisations was to obtain a thorough overview of the relevant components of each operationalisation.

Table 1. *Number of sub-themes of the overarching themes from the operationalisations of abstinence, remission, recovery, relapse and slip from the 276 studies*

Operationalisations	Abstinence, *n* (%)	Remission, *n* (%)	Recovery, *n* (%)	Relapse, *n* (%)	Slip, *n* (%)
Use[a]	39 (42)	12 (22)	5 (29)[b]	47 (26)[c]	9 (31)[d]
Frequency and amount of use				49 (27)	
Amount					14 (44)
Time	43 (47)	18 (33)	5 (29)	30 (17)	6 (19)
Measure	9 (9)			47 (26)	
Diagnostic criteria		20 (37)			
Psychosocial			3 (18)		
Other	2 (2)	4 (7)	3 (18)	9 (5)	2 (6)

[a]No or some use. [b]Some or any use, and not previous level of use. [c]No or some use. [d]Any use.

To assess long-term studies and the frequency of measuring points that were used to define 'relapse' after long-term abstinence, the cut-off was set to studies with a follow up of at least 2 years. Following cut-offs in remission according to diagnostic guidelines in DSM-5 and International Classification of Diseases, 11th revision (12 months) [29,31] and research (3 years) [32,33], our 2-year criterion may be regarded as a practical tool and a minimum criterion for identifying long-term studies. To determine factors relevant for defining 'late relapse', we investigated time criteria for abstinence, remission and recovery since these factors are used to define periods of non-use and may be used to distinguish early from late relapse.

Results

Search results

The electronic search returned 3426 articles. After duplicates were removed, 1981 articles remained. A hand search of reference lists from reviews and meta-analyses returned a further 17 articles. We screened the title/abstract of the 1998 articles. A full-text evaluation was conducted for 366 articles, of which 276 met the inclusion criteria and were included in the final synthesis. Details of the search results are summarised in Figure 1.

Operationalisations of abstinence, remission, recovery, relapse and slip

What follows is a descriptive presentation of our results. In the discussion part, we will elaborate on the intersection between the five concepts. Details of the included operationalisations of abstinence, remission, recovery, relapse and slip are summarised in Table 1.

Operationalisations of abstinence. Three overarching themes emerged from the tabulation of the operationalisation of abstinence. Those were *Time* (47%), *Measure* (9%) and *Use* (42%), and included 98% of the included studies. Excluded criteria were diagnostic criteria and binary statements of yes/no, because they appeared infrequently. *Time* reflects varying ways of operationalising *time length*, such as a specific number of weeks/months for early, intermediate and long-term/sustained abstinence.

Operationalisation of remission. Three overarching themes emerged from the tabulation of the operationalisations of remission. Those were *Diagnostic criteria* (37%), *Use* (22%) and *Time* (33%), and included 92% of the included studies. The criteria of 'not hospitalised', 'not missed work' and 'no drinking problem' were excluded because they were infrequent. *Diagnostic criteria* reflect to what extent specific symptoms were used to assess remission. Some operationalisations stated that 0 symptoms of SUD or AUD counted as remission (50%), while others counted some but not all symptoms as indicative of remission (19%). Such operationalisations were often termed 'partial remission'. *Use* denotes both *no use* and *any use* of a given substance, but also *some use* or some specified amount, and frequency. *Some use* was not specified [34], but a specified amount was often stated as a particular level of use (e.g. three ounces) with a particular frequency (e.g. per day, week or month) [35,36]. Some of these operationalisations included non-use, while others used diagnostic criteria (e.g. no Research Diagnostic Criteria symptoms [37]). *Time* reflects the different usage of temporal criteria to assess remission. For example, the operationalisation of *remission* as abstinent for 1 to 36 months was categorised under *Time*.

Operationalisation of recovery. Three overarching themes emerged from the tabulation of the operationalisation of recovery. Those were *Psychosocial* (18%),

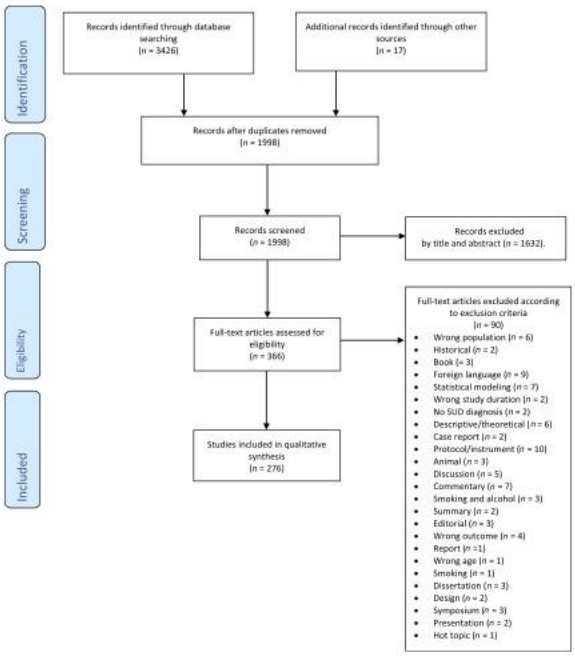

Figure 1. *PRISMA diagram of study selection process. SUD, substance use disorder.*

Time (29%) and *Use* (29%) and included 76% of the included studies. Excluded criteria were in treatment, no intoxication, measure and substance problems, as they were infrequent. Time specifications were more frequent than specific measures of recovery. *Psychosocial* reflects improvements in other areas of adjustment or functioning than substance use (e.g. housing, income, drug-free friendships and work/school [38]). However, not all of the studies specified the content of *psychosocial* [39]. *Time* and *Use* denote a specific time criterion (i.e. length of abstinence) and substance use (i.e. either non-use or some use). Two studies included some use [40,41].

Operationalisation of relapse. Four overarching themes emerged from the tabulation of the operationalisation of relapse. Those were *Measure* (26%), *Time* (17%), *Use* (26%) and *Amount and frequency* (27%), and included 96% of the included studies. One operationalisation of 'relapse' used illegal behaviour as a criterion. This criterion was excluded from the tabulation of relapse since it

was infrequent. *Measure* reflects different measuring instruments used to assess relapse. The measures used were self-reports (e.g. Drug Use Disorder Identification Test), biomarkers, interviews with family or close friends, surveys and diagnostic criteria (e.g. DSM). *Time* reflects the different usage of temporal criteria to assess relapse. For example, one study stated that 1 week or more of substance use counted as a relapse [42]. *Use* denotes any use of a given substances to assess relapse. *Amount and frequency* represents a specified amount of a given substance and a specified frequency of use when operationalising a relapse. For example, substance use on a regular basis on more than one-third of days from first use to follow up counted as a relapse [43]. The overarching themes *Measure*, *Use* and *Amount and frequency* overlap. All three are related to consumption. However, they represent different levels of detail in operationalising relapse. Whether a study operationalises relapse as any use [44] or 60/48 g of alcohol intake for a male/female on at least one drinking occasion [45] entails different levels of detail in the conceptualisation and measuring of relapse.

Operationalisations of slip or lapse. In this study 'slip' and 'lapse' are considered synonyms and are used interchangeably. Three overarching themes emerged from the tabulation of the operationalisations of slip. Those were *Use* (31%), *Time* (19%) and *Amount* (44%), and included 94% of the included studies. Excluded criteria were biomarker, treatment and health since they appeared infrequently. *Use* denotes any use, or some use, and not using a given substance at the previous level before achieving abstinence. *Time* represents a specified temporal criterion, such as drinking for 1 day or using a substance and then not using it for a week. *Amount* denotes a specified quantity of the substance used.

No operationalisation of relapse, follow-up duration and frequency of measuring points

Eighty-nine (32%) studies mentioned relapse but provided no definition. One hundred and ninety-five (71%) studies had a follow-up duration of less than 2 years, while 81 studies had 2 years or more. Sixteen (6%) studies had a maximum follow-up duration of 2 years and 65 (24%) studies had more than 2 years. Thus, there were more studies on short-term abstinence than on long-term abstinence.

The frequency of measuring points for studies with a maximum follow-up duration of 2 years ranged from 2 to 24 (see Table 2 for details). Forty-seven of the 65 studies with longer follow-up than 2 years contained 0–6 measuring points during follow-up. Fifteen of the 65 studies contained more measuring points. In total, 38 (47%) of the 81 studies did not provide an operationalisation of 'relapse'.

The time criteria in abstinence, remission and recovery

Forty-seven (17%) of the studies had definitions of 'abstinence' involving a time criterion specifying the duration of abstinence needed to be assessed as abstinence. See Table 2 for details. Of these studies, 28 (10%) contained a definition of 'long-term abstinence' or 'sustained' or 'protracted abstinence'. There were 15 different time criteria. Some of these definitions used *time range* as a criterion (e.g. 3–12 months). We reported the lowest number (i.e. three in 3–12 months). We also did not include a study that reported the average long-term abstinence [83].

Twenty-two (8%) studies included a definition of 'remission'. Seven studies used 26 weeks as the time criterion for abstinence to be considered remitted. Seven studies used 12 months. One study used 1–36 months. Two included moderate drinking [35,72]. Two (9%) studies contained several definitions of 'remission' [e.g. 74].

Seven (3%) studies included a definition of 'recovery' and five (2%) studies included a specific time criterion. Three studies used 12 months. One study used 2 years, while another study used 5 years.

These descriptive results show different use of time criteria within and between abstinence, remission and recovery operationalisations.

Relapse after long-term abstinence

Of the studies with a follow-up duration of 96 weeks, one (6%) contained a definition of 'long-term abstinence'. Of the studies with a follow-up duration of more than 96 weeks, four (6%) contained a definition of 'long-term abstinence'; one (2%) study reported on late relapse and long-term abstinence while one (2%) reported on early relapse and long-term abstinence. One (6%) study with a follow-up duration of 96 weeks did not report relapse or any other definition [84]. Seventeen (27%) studies with a follow-up duration of more than 96 weeks did not report relapse or any other definition (see Table 3 for details). The remaining studies reported definitions of either 'abstinence', 'remission' or 'recovery', or a combination of these. In total, there were six (8%) studies mentioning long-term abstinence, of which one (1%) included early relapse and one (1%) included late relapse.

Table 2. *Time criteria in abstinence, remission and recovery*

	Time criteria		
Study	Abstinence	Remission	Recovery
Marchesi *et al.* [46]	28 days		
Zou, Durazzo and Meyerhoff [47]	4–28 weeks[a]		
Davis *et al.* [48], Gazdzinski, Durazzo and Meyerhoff [49], Li *et al.* [50]	24 weeks		
Currie *et al.* [51]	48 weeks		
Huang *et al.* [52], Li *et al.* [53]	64 weeks		
Elsheikh [54]	3 months		
Ghita *et al.* [55]	<4 months		
Chen *et al.* [56]	6–8 months		
Su *et al.* [57]	8 months		
Litt *et al.* [58]	11 months		
Trabut *et al.* [59]	12 months		
Yang *et al.* [60]	15 months		
Daig *et al.* [61], Prosser *et al.* [62]	18 months		
He *et al.* [63]	1 year		
Bartels *et al.* [64], Boulze, Launay and Nalpas [65]	2 years		
Carroll *et al.* [66], Zou *et al.* [67]	3 years		
Zhu *et al.* [68], Weisner *et al.* [69]	5 years		
Hasin, Endicott and Keller [37], Hasin *et al.* [70], Samet *et al.* [71]		26 weeks	
Moos and Moos [35], Moos and Moos [72], Xie *et al.* [73], Xie *et al.* [39].		6 months	
Dawson *et al.* [41], Torgersen *et al.* [74], Rumpf *et al.* [75], Husky *et al.* [76], Dunlop and Tracy [77]		12 months	
Thoma *et al.* [78], Yeh, Che and Wu [79]		1 year	
Anthenelli *et al.* [80]		1–36 months[b]	
Dawson *et al.* [41]			12 months
Best *et al.* [81], Xie *et al.* [39]			1 year
Bjornestad *et al.* [38]			2 years
Hser [82]			5 years

[a]Long-term abstinence defined as 4–28 weeks of abstinence. [b]Remission defined as 1–36 months of abstinence.

Discussion

The most important finding in the present study is the detailed field description of the different operationalisations of key concepts for understanding relapse in SUD. Such variance is a challenge to the accumulation of knowledge, which is a central aspect of normal science [150]. Time and use appeared in all operationalisations. Other overarching themes were measure, diagnostic criteria, psychosocial and amount and frequency, thus indicating that time and use are the most common factors used to operationalise abstinence, remission, recovery, relapse and slip. However, the operationalisations varied. There were more short-term studies than long-term studies. Among the long-term studies, one reported on early relapse and long-term abstinence while another reported on late relapse and long-term abstinence. Consequently, this suggests that SUD research does not consistently differentiate between early and late relapse.

Conceptualising relapse

We find that the operationalisation of relapse varies, and it revolves around the four categories *measure*, *time*, *use* and *amount and frequency*. The four overarching themes vary across operationalisations depending on the specific study. Some operationalisations stated that any use counted as a relapse, while others specified the amount and frequency of using a given substance needed to count as relapse. Consequently, there are different levels of detail in relapse operationalisations. Operationalisations using *any use* of a substance or alcohol are probably comparable with each other [44,107]. However, defining 'relapse' as *any use* makes relapse challenging to separate from a slip. Operationalisations using reinstatement or return to the previous substance use level [151] may be more adequately categorised as *relapse* than *any use*. This is in line with the general idea that relapse is the return of symptoms of a disease after a period of improvement [152].

Table 3. *Frequency of measuring points for studies with follow up of 2 years and more than 2 years, including operationalisations of abstinence, remission, recovery, relapse and slip*

Study and follow up	Frequency of measuring points	Operationalisations
Dolsen and Harvey [84] (varies),[a] 96 weeks	2	No[b]
Rumpf *et al.* [75], 96 weeks	2	Remission
McKee, Bonn-Miller and Moos [85], 96 weeks	3	Relapse
Hasin, Endicott and Keller [37], 96 weeks	4	Relapse and remission
Costa *et al.* [86], 96 weeks	4	Abstinence
Bartels *et al.* [64], 96 weeks	5	Long-term abstinence
Kopak, Haugh and Hoffmann [87], 96 weeks	5	Relapse
Loosen, Dew and Prange [88], 96 weeks	5	Abstinence and relapse
Schmidt, Helten and Soyka [89], 96 weeks	5	Abstinence
Besson *et al.* [90], 96 weeks	6	Relapse
Burtscheidt *et al.* [91], 96 weeks	6	Abstinence, lapse and relapse
Harned *et al.* [92], 96 weeks	7	Relapse and remission
Corrao *et al.* [93], 96 weeks	8	Relapse
Scott, Dennis and Foss [94], 96 weeks	9	Recovery
Chen *et al.* [95], 96 weeks	24	Relapse
Wang *et al.* [96], 96 weeks	25	Relapse
Torgersen *et al.* [74], 384 weeks[c]	Varies	Relapse and remission
Trabut *et al.* [59], 288 weeks	Varies	Early relapse and long-term abstinence
Booth *et al.* [97], 144 weeks	1	No
Decker *et al.* [98], 240 weeks	1	No
Dore *et al.* [99], 108 weeks	1	Relapse
Lloyd [100], 1008 weeks	1	Relapse and abstinence
Lucey *et al.* [101], median of 252 weeks	1	Relapse
Merlo *et al.* [102], 240 weeks	1 (retrospective chart)	No
Mutschler *et al.* [103], more than 200 weeks	1, not specified	Relapse
Onishi *et al.* [104], mean follow up 245 weeks	1, retrospective	No
Pfitzmann *et al.* [105], median of 356 weeks	1, retrospective	No, lapse
Wu *et al.* [106], 240 weeks	1	Relapse
Brecht and Herbeck [107], 240 weeks	2	Relapse and abstinence
Cushman Jr. [108], 384 weeks	2	Relapse
de Soto, O'Donnell and de Soto [109], 192 weeks	2	Relapse
Deruytter *et al.* [110], mean follow up of 220 weeks	2	Relapse and slip
Evans *et al.* [111], 480 weeks	2	No
Fernandez-Hermida *et al.* [112], 384 weeks	2	Relapse
Haller *et al.* [113], 480 weeks	2	Remission and long-term recovery
Hser *et al.* [114], 1440 weeks	2	Relapse
Johnson-Greene, Adams *et al.* [115], 128 weeks	2	No
Marel, Mills *et al.* [116], 480–528 weeks	2	No
Price, Risk and Spitznagel [117], 1200 weeks	2.	Remission
Tan *et al.* [118], 120 weeks	2	No
Hser [82], 1584 weeks	3	Long-term recovery
Haastrup and Jepsen [119], 528 weeks	3	No
Lavee and Altus [120], 144 weeks	3	Late relapse and long-term abstinence
Rosenbloom, Pfefferbaum and Sullivan [121], 192 weeks	3	Relapse and abstinence
Li *et al.* [122], 240 weeks	3	Relapse
Weisner *et al.* [69], 240 weeks	3	Long-term abstinence
He *et al.* [123], 720 weeks	4	Long-term abstinence
Muller, Znoj and Moggi [124], 240 weeks	4	Abstinence
Schmeding *et al.* [125], 144–480 weeks	4	Recurrent
Scott, Foss and Dennis [126], 144 weeks	4	Relapse
Vanderplasschen, Bloor and McKeganey [127], 132 weeks	4	No
Finney and Moos [36], 480 weeks	5	Remission and relapse
Gual *et al.* [128], 960 weeks	5	Abstinence
Moos and Moos [35], 768 weeks	5	Relapse (remission)
Moos and Moos [72], 768 weeks	5	Non-remitted, remission
Pfefferbaum *et al.* [129], 384 weeks	1–5 times	Relapse

(Continues)

Table 3. (Continued)

Study and follow up	Frequency of measuring points	Operationalisations
Grella *et al.* [40], 288 weeks	6	Recovery
Rubio *et al.* [130], 288 weeks	6	Relapse
Vaillant *et al.* [131], 384 weeks	6	Remission and abstinence
Zhu *et al.* [68], 240 weeks	6	Long-term opioid abstinence
Maisto, McKay and O'Farrell [132], 120 weeks	7	Abstinence
Kassani *et al* [133], 192 weeks	9	Relapse
O'Farrell, Choquette and Cutter [134], 120 weeks	9	No
Brunette *et al.* [34], 480 weeks	10	Relapse and remission
Ge *et al.* [135], 240 weeks	11	Relapse
Hasin, Endicott and Keller [136], 240 weeks	11	Relapse and remission
Xie *et al.* [39], 480 weeks	11	Remission and recovery
Mueller *et al.* [137], 576 weeks	15	Recurrence and recovery
Dong and Kerr [138], 1008 weeks	16	No
Dennis *et al.* [139], 192 weeks	17	No
Hosseini *et al.* [140], 192 weeks	17	Relapse
Genberg *et al.* [141], 960 weeks	20	Cessation
Xie *et al.* [142], 480 weeks	21	Remission and relapse
Maremmani *et al.* [143], 144 weeks	36	Relapse and slip
Berlakovich *et al.* [144], 552 weeks	72	No
Maisto *et al.* [145], 480 weeks	4	Relapse
Huh, Kim and Hong [146], 432 weeks	1 (retrospective)	No
Stephens *et al.* [147], 136 weeks	6	Abstinence
Webb *et al.* [148], 192 weeks	3 (cross-sectional)	No
Bruguera *et al.* [149], 336 weeks	1 (retrospective)	Lapse, relapse, abstinence

[a]Some were measured more. [b]No means that there were no definition/operationalisation. [c]Expressed in weeks to show variation. This is done for all the 'more than two years' studies in the table.

Moving to the overarching theme, *amount and frequency*, specifying previous substance use makes it possible to include all levels of previous substance use and to assess the degree of a relapse. The amount and frequency of use should reflect substance use levels before reduced use or non-use for the current episode of use to be classified as a relapse. In this way, one could state that the individual had returned to a level of previous use. However, one challenge encountered when using such a criterion arises from the fact that individuals who use a different substance than previously would not be classified as relapsed. Further, focusing too much on the amount and frequency may give priority to substance use over other symptoms used to assess relapse, which is significant since SUD involves other factors than substance use, including social and professional functioning and other comprehensive and stable behavioural changes [11,153].

The operationalisation of *time* should reflect the duration of the relapse and separate a relapse from a slip. *Time* should also be related to *amount and frequency*, since how long a person uses, and with what frequency, gives information about the severity of the relapse. Using a *measure* to operationalise relapse was common. However, different measuring procedures were applied [38,154]. Measuring relapse solely by biomarkers [155] may be more useful with *any use* than with *amount and frequency*, since biomarkers often yield binary results. However, 'relapse' defined as *any use* and measured with biomarkers cannot differentiate between relapses. Such operationalisations sustain the focus on substance use or abstinence as the most important part of recovery.

The results show that there is no consensus on the operationalisation of relapse and that operationalisations focus mostly on substance use without considering behavioural changes over time, such as personal and social functioning [9,11]. In this regard, our results are on par with Miller [4] that the 'relapse' concept is mostly perceived as a binary judgement of either abstinent or relapsed. Operationalising relapse in this way appears to overlook how common relapse is in SUD recovery [4]. Further, omitting that the protracted behavioural changes occurring in personal and social functioning are heterogeneous and have different pathways [6]. Conceptualising 'relapse' in a binary fashion might substantiate 'relapse' as a static phenomenon that is the same whenever it happens in recovery. As such, the 'relapse' concept may neglect the relevance of behavioural change to maintain abstinence by

focusing too much on substance reduction. Furthermore, a binary conceptualisation hides that 'relapse' is a dynamic phenomenon influenced by the duration of abstinence and behavioural changes. Thus, a relapse is influenced by when it happens in the recovery process [11]. One possible consequence of viewing 'relapse' as static is that treatment studies and guidelines might differentiate poorly between early and late relapse. The various operationalisations of abstinence, remission, recovery, relapse and slip make it difficult to compare studies. Construct validity is accordingly low. *Construct validity* concerns the relatedness of a construct to its theoretical meaning [156]. For example, different operationalisations of 'remission' and 'recovery' indicate that the operationalisations are partially not related to their constructs theoretical meaning. Different operationalisations imply that different criteria are used to conceptualise and thus measure, for example, 'remission'. Since different operationalisations are used to refer to the same construct, it suggests that the operationalisations partially reflect the construct's theoretical meaning. A similar phenomenon has been acknowledged in social psychology, where inconsistent terminology about the same construct suggests impeding the accumulation of scientific findings of the particular construct [23]. Further, since the operationalisations differ about the same phenomena, their representations of reality differ. Thus, the same approaches may be used to prevent early and late relapse, implying poor differentiation and sub-optimal treatment.

The affinity between remission, recovery and relapse

Because SUD is characteristically cyclical in nature [2,3] remission, recovery and relapse are interrelated. We find that the operationalisations of remission and recovery mainly focused on use, time, psychosocial factors and diagnostic criteria. For remission, the differences in the use criteria mainly revolved around some use or no use of a substance or other symptomatology (i.e. diagnostic criteria) [36,41,75]. Some operationalisations of remission stated that 'some use' was defined as partial remission [92]. An operationalisation of this kind presumes that abstinence is the primary goal in approaches to SUD. However, this operationalisation appears not to take into consideration that SUD is often a cyclic process [3]. Some of the operationalisation of recovery also presumes that abstinence is the primary goal in approaches to SUD which is contrary to the theoretical meaning of recovery [6]. Thus, current operationalisations of remission and recovery give precedence to abstinence. As such, they do not properly observe the degree to which personal [7,8] and social [10] functioning are seen as paramount to the maintenance of stable substance reduction or abstinence [9]. Moreover, remission and recovery is attainable with and without substance reduction [157,158]. Consequently, these definitions fail to capture the multidimensional and heterogenic aspect of recovery [6] and that people in recovery may function well in spite of inebriety [5]. Further, relapse is not incorporated as a common aspect of SUD recovery and remission [4] since abstinence is given precedence in research operationalisations. Since relapse research influences SUD practice, the preference for abstinence in research operationalisations may influence clinicians' understanding of relapse in practice. The practical implication of this approach may be that a relapse is viewed as both common and a failure to recover rather than as a common set-back in recovery, which may in turn lead to poor motivation for patients in recovery, as transferring from 'full' remission or recovery to 'partial' indicates a failure in treatment, even though a relapse is expected to happen more times than not [2,19,159,160]. Thus, overlooking that recovery involves more than abstinence and remission from symptoms [161].

There were various time criteria in the operationalisation of remission and recovery [70,76,81,82]. The time criterion for remission was often 6 months, while for recovery, it was often 1 year. However, these time criteria appear to be too short when considering the vast behavioural changes SUD recovery requires [11]. The operationalisations of remission and recovery give priority to the ability to maintain abstinence over time while simultaneously minimising the behavioural changes needed for such maintenance [7,8,10,11]. The scope of this review was to investigate operationalisations in research, which overlaps with and influence clinical thinking. The narrow focus on abstinence makes it hard to take into account how common relapse actually is, and that relapsing is dependent on when it happens. Thus, relapse, remission and recovery cannot be assessed primarily from substance use and assessment should also take into account gradual and different behavioural changes.

Future research

One approach to improving operationalisations of relapse is to interview service users about personal challenges related to short-term versus long-term abstinence. In-depth interviews with service users may provide relevant information about constituents belonging to relapse and may increase ecological validity. Such studies may guide measure development and determining which time criteria to use in relapse research.

For example, separating short-term and long-term abstinence at 1 year could be a useful starting point. Precision in conceptualisation may also increase the focus on aspects other than substance use reduction. Thus, emphasising that other aspects than a reduction of substance use are important in remission and recovery. Since long-term abstinence involves a long time period of refraining from substance use, emphasis on the act of *refraining* is important. Future studies in statistical modelling could investigate change in factors relating to personal and social recovery. By dividing SUD service users into two categories, early and late relapse, it may be possible to analyse differences in relapse patterns. Another possibility is to investigate if the 'relapse' concept could be specified according to substance type or population, hence resulting in a more specific conceptualisation of relapse rather than a global all-encompassing one. In this regard, Skinner's [162] guide to the construct of control may be used as a foundation to mitigate the inconsistent terminology applied to the same concept, such as relapse.

Strengths and limitations

There are two notable strengths of the current study. PROSPERO registration ensured that the study protocol was publicly available before the study was conducted. Secondly, the review was conducted using the PRISMA guidelines. Additionally, two raters independently determined what studies were included. The incorporation of broad inclusion criteria to investigate all possible operationalisations related to the topic made it possible to investigate the uniformity of relapse operationalisations and if research differentiated between early and late relapse in SUD. However, some operationalisations may have been missed. Further, each operationalisation was analysed using narrative synthesis, which has methodological and conceptual limitations. Methodologically, the emerging themes were only one way of grouping the operationalisations. Hence, replicating the tabulation of operationalisations might result in different themes. Conceptually, the synthesis was an empirical and descriptive investigation, not theory-driven, which might complicate applying the results for theory building.

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Conflict of Interest

The authors have no conflicts of interest.

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Appendix 1

Medline search for replication

Database(s): *Ovid MEDLINE(R) ALL* 1946 to 7 January 2021
Search Strategy: relapse update

#	Searches	Results
1	substance-related disorders/ or amphetamine-related disorders/ or cocaine-related disorders/ or heroin dependence/ or inhalant abuse/ or marijuana abuse/ or opioid-related disorders/ or morphine dependence/ or opium dependence/ or phencyclidine abuse/ or psychoses, substance-induced/ or substance abuse, intravenous/ or substance abuse, oral/	
2	((heroin or marijuana or marihuana or hashish or cannabis* or amphetamine* or opioid* or cocaine or opiate* or opium* or morphine* or ecstasy or methamphetamine* or polydrug* or 'poly-drug*' or 'poly substance*' or 'polysubstance*' or multidrug* or 'multi drug*' or solvent or inhalant* or narcotic* or drug* or substance*) adj2 (abus* or misus* or addict* or dependen* or 'use*' or usage* or disorder*)).hw,kf,ti,ab.	
3	(sud or suds or sniff* or narcotism or addicts or addiction).hw,kf,ti,ab.	
4	Alcohol-Related Disorders/ or alcoholism/	
5	(alcohol* adj2 (abus* or misus* or addict* or dependen* or "use*" or usage* or disorder*)).hw,kf,ti,ab.	
6	(problem adj2 drinking).kf,ti,ab.	
7	(aud or auds).kf,ti,ab.	
8	1 or 2 or 3 or 4 or 5 or 6 or 7	
9	((recovery or recovering or autorecovery or remission or sober or sobriety or abstinen* or abstained or 'drug free' or 'alcohol free') adj3 (full or longterm* or 'long term*' or prolong* or 'long last*' or longlast* or lengthy or stable)).kf,ti,*ab.	
10	alcohol abstinence/	
11	(full or longterm* or 'long term*' or prolong* or 'long last*' or longlast* or lengthy or stable).kf,ti,ab.	
12	10 and 11	
13	9 or 12	
14	(relaps* or recurrence* or lapse* or slip).kf,ti,ab.	
15	recurrence/	
16	14 or 15	
17	8 and 13 and 16	
18	remove duplicates from 17	
19	smoking.m_titl.	
20	tobacco.m_titl.	
21	cessation.m_titl.	
22	nicotine.m_titl.	
23	19 or 20 or 21 or 22	
24	18 not 23	
25	exp animals/ not humans.sh.	
26	24 not 25	353
27	*limit 26 to (dt = 20 200 304–20 210 108 or rd = 20 200 304–20 210 108)*	*77*

Appendix 2

Deviation from the study protocol

1. Change of title and aim: focus shifted to investigating operationalisations of relapse after short-term and long-term abstinence and remission, recovery, and slip rather than focusing on relapse and lapse patterns and related trajectories.
2. Included studies with alcohol use disorder or alcohol detoxification.
3. Excluded studies with smoking, and smoking and alcohol.
4. Completion date was extended. The reason was that the review process took longer time.
5. A fifth co-author was included, which was not mentioned during PROSPERO registration.

List of Publications

Paper I – Is the relapse concept in studies of SUD "A one size fits all" concept? A systematic review of relapse operationalisations

Paper II – The predicting role of psychological functioning in remission and recovery in substance use disorder across 5 years

Paper III – Changes in the trajectories of drug-free friendships and substance use among a cohort of individuals with multiple substance use disorders