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Charakteristika und Behandlungsergebnisse von stationär behandelten Patienten mit Zwangsstörung

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Inhaltsverzeichnis

Abkürzungsverzeichnis

KVT	Kognitive Verhaltenstherapie
Y–BOCS	Yale–Brown Obsessive Compulsive Scale
ACT	Akzeptanz- und Commitment-Therapie
OCD	Obsessive–compulsive disorder
CBT	Cognitive-behavioral therapy
WTE	Willingness to experience unpleasant thoughts, emotions, and bodily sensations

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Poster

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1. Beitrag zu den Veröffentlichungen

1.1 Beitrag zu Artikel I

Die Doktorandin leistete folgende Beiträge zu Artikel I:

- Konzeptualisierung
- Datenerhebung
- Datenaufbereitung
- Methodik
- Statistische Analyse
- Schreiben – ursprüngliche Version des Artikels
- Schreiben – Überprüfung und Bearbeitung des Artikels

1.2 Beitrag zu Artikel II

Die Doktorandin leistete folgende Beiträge zu Artikel II:

- Datenerhebung
- Datenaufbereitung
- Statistische Analyse
- Schreiben – ursprüngliche Version des Artikels
- Schreiben – Überprüfung und Bearbeitung des Artikels

1.3 Beitrag zu Artikel III (Anhang)

Die Doktorandin leistete folgende Beiträge zu Artikel III:

- Datenaufbereitung
- Statistische Analyse
- Schreiben – ursprüngliche Version des Artikels
- Schreiben – Überprüfung und Bearbeitung des Artikels

1.4 Beitrag zu Artikel IV (Anhang)

Die Doktorandin leistete folgende Beiträge zu Artikel IV:

- Datenaufbereitung
- Statistische Analyse
- Schreiben – ursprüngliche Version des Artikels
- Schreiben – Überprüfung und Bearbeitung des Artikels

1.5 Beitrag zu Artikel V (Anhang)

Die Doktorandin leistete folgende Beiträge zu Artikel V:

- Schreiben – ursprüngliche Version des Artikels
- Schreiben – Überprüfung und Bearbeitung des Artikels

2. Einleitung

2.1 Die Zwangsstörung und deren Behandlung

Die Zwangsstörung ist eine psychische Störung mit einer Lebenszeitprävalenz zwischen 1 und 3 Prozent (Fawcett et al., 2020; Kessler et al., 2012). Das mittlere Ersterkrankungsalter der meisten Betroffenen liegt bei etwa 20 Jahren (Brakoulias et al., 2017; DGPPN, 2022). Die Zwangsstörung ist durch das Auftreten von Zwangsgedanken, Zwangshandlungen oder beidem gekennzeichnet (Abramowitz et al., 2009). Zwangsgedanken sind wiederkehrende Gedanken und Impulse, die von den Betroffenen als aufdringlich beschrieben werden (Abramowitz et al., 2009). Sie lösen bei Menschen mit Zwangsstörung großes Unbehagen und Angst aus (Abramowitz et al., 2009). Zwangshandlungen hingegen sind repetitive Verhaltensweisen (z.B. mehrfaches Händewaschen und dessen Überprüfung) oder sich wiederholende geistige Handlungen (z.B. Beten, Zählen oder Denken von als subjektiv gut empfundenen Gedanken, um als schlecht wahrgenommene Gedanken rückgängig zu machen; Abramowitz et al., 2009). Menschen mit Zwangsstörung führen Zwangshandlungen durch, um Unwohlsein, das durch Zwangsgedanken hervorgerufen wird, zu reduzieren oder ein gefürchtetes Ereignis zu verhindern (Abramowitz et al., 2009). Betroffene sind sich häufig dessen bewusst, dass die Durchführung von Zwangshandlungen übertrieben ist (World Health Organization, 1993).

Wenn Menschen mit Zwangsstörung keine adäquate Behandlung erhalten, besteht ein hohes Risiko, dass sich die Erkrankung chronifiziert (Abramowitz et al., 2009; Mataix-Cols et al., 2002). In der S3-Leitlinie Zwangsstörungen wird daher empfohlen, dass Betroffenen eine störungsspezifische Kognitive Verhaltenstherapie (KVT) mit Exposition und Reaktionsverhinderung als Psychotherapie der ersten Wahl angeboten werden soll (DGPPN, 2022). KVT ist eine Form der Psychotherapie und zielt darauf ab, dysfunktionale Denk- und Verhaltensmuster mithilfe von wissenschaftlich fundierten Interventionen zu verändern, um die Symptomatik und somit das Leid der Betroffenen zu verringern (Carpenter et al., 2018; Hofmann et al., 2013). Exposition und Reaktionsverhinderung ist ein Therapiebaustein, der in der kognitiv-verhaltenstherapeutischen Behandlung der Zwangsstörung von größter Relevanz ist. Hierbei konfrontieren sich Betroffene wiederholt mit symptomrelevanten Situationen und Stimuli, die Zwangsgedanken und

Zwangshandlungen hervorrufen (Abramowitz et al., 2009). Die Betroffenen achten dabei darauf, keine gegensteuernden oder neutralisierenden Verhaltensweisen auszuführen (Hezel & Simpson, 2019). Dadurch lernen sie, dass die entsprechenden Situationen und Stimuli möglicherweise unangenehm sind, aber keine reale Gefahr bergen. Es ist davon auszugehen, dass Fortschritte während der Expositionen mit Reaktionsverhinderung über Mechanismen wie das inhibitorische Lernen vermittelt werden (Craske et al., 2014).

Die psychotherapeutische Behandlung der Zwangsstörung erfolgt häufig ambulant. Dennoch gibt es eine Reihe an Faktoren, aufgrund derer eine Behandlung im stationären Setting indiziert ist. Diese werden in der S3-Leitlinie spezifiziert (DGPPN, 2022) und sind die folgenden:

- Fehlen oder Nicht-Ansprechen auf leitliniengerechte störungsspezifische ambulante Therapie
- Gefahr für das Leben
- Schwerwiegende Vernachlässigung oder Verwahrlosung
- Das Zwangs- und Vermeidungsverhalten ist entweder so schwerwiegend oder wird so gewohnheitsmäßig ausgeführt, dass ein normaler Tagesablauf und das Wahrnehmen einer ambulanten Therapie nicht mehr möglich sind
- Starker Leidensdruck und starke Beeinträchtigung der psychosozialen Funktionsfähigkeit
- Vorliegen psychischer oder somatischer Komorbiditäten, die eine ambulante Behandlung erheblich erschweren
- Ausgeprägtes, krankheitsförderndes häusliches Umfeld.

2.1.1 Effekte (teil-)stationärer Behandlung auf Zwangssymptome

Ein Großteil der Evidenz zu KVT bei der Zwangsstörung stammt aus Studien, in denen ambulante Behandlung eingesetzt wurde (DGPPN, 2022). Es gibt allerdings auch Studien zu den Effekten stationärer Therapie. Hierbei ist die systematische Übersichtsarbeit und Meta-Analyse von Veale et al. (2016) zu nennen. Das Ziel dieser Studie war es, den Effekt von teilstationären und stationären Behandlungsprogrammen bei Menschen mit Zwangsstörung zu bestimmen. Hierfür wurden 19 Studien mit insgesamt 2306 Teilnehmenden identifiziert und in die

meta-analytischen Berechnungen eingeschlossen. Die gepoolte Effektstärke für die Veränderung von Aufnahme zu Entlassung (Hedges‘ *g*) betrug 1,87. Dies entspricht einem großen Effekt (Veale et al., 2016). Dennoch weist die Studie zwei wichtige Einschränkungen auf. Zum einen wurden lediglich Studien eingeschlossen, in denen die Stärke der Symptomatik der Zwangsstörung mit der Interview-Version der Yale–Brown Obsessive Compulsive Scale (Y–BOCS) erfasst wurde (Veale et al., 2016). Somit wurden Effekte aus Studien, in denen die Stärke der Symptomatik mit anderen störungsspezifischen Instrumenten gemessen wurde, außer Acht gelassen. Zum anderen wurden in Veale et al. (2016) keine Katamnesedaten einbezogen. Dementsprechend geht aus der Studie nicht hervor, ob die durch die (teil-)stationäre Behandlung erzielten Effekte nach Entlassung aufrechterhalten werden konnten.

2.1.2 Dauer von Alltagsaktivitäten

In der Regel liegt der Fokus in der Diagnostik und der daraus abgeleiteten Behandlung auf der Art und Schwere der zwangsstörungsbezogenen Kernsymptome. Allerdings ist weniger bekannt, inwiefern sich diese Symptomatik auf den gesamten Alltag bzw. den Tagesablauf der Patienten auswirkt. Die Evidenz zu dieser Thematik ist bisher äußerst gering, dennoch gibt es Hinweise darauf, dass die Menge an Zeit, die für die Beschäftigung mit Zwangsgedanken und/oder Zwangshandlungen aufgebracht wird, mit geringerer Lebensqualität und stärkerer Beeinträchtigung im täglichen Funktionsniveau korreliert (Eisen et al., 2006; Macy et al., 2013; Meule & Voderholzer, 2020). Bisher gab es noch keine Studie, die die Dauer von Alltagsaktivitäten bei Personen mit Zwangsstörung systematisch erfasst und mit einer Kontrollgruppe an Personen ohne Zwangsstörung verglichen hat. Durch eine solche Studie und eine daraus resultierende Normwerttabelle könnten die von den Zwängen besonders stark betroffenen Lebensbereiche identifiziert und in Expositionsübungen entsprechend besser adressiert werden. Dadurch könnten die Betroffenen auch eine höhere Symptomeinsicht entwickeln, was wiederum den Effekt der (teil-)stationären Behandlung unterstützen würde (Koch et al., 2023, p. 88; Middleton & Hezel, 2019).

2.1.3 Bereitschaft zur Konfrontation als möglicher Prädiktor

Bei einer Expositionsbehandlung werden die Patienten mit den für sie angstbesetzten Situationen und Stimuli konfrontiert, was zwangsläufig mit unangenehmen Gefühlen, Gedanken und körperlichen Empfindungen einhergeht. Die Patienten müssen zu Beginn dieser Behandlung also eine gewisse Bereitschaft zeigen, sich diesen unangenehmen Aspekten zu stellen. Da die Exposition mit Reaktionsverhinderung ein zentrales Element in der psychotherapeutischen Behandlung der Zwangsstörung ist, ist denkbar, dass diejenigen Patienten, die motivierter sind, die häufig als herausfordernd wahrgenommenen Expositionsübungen zu absolvieren und sich somit ihren unangenehmen Gefühlen, Gedanken und körperlichen Empfindungen zu stellen, eine besonders starke Reduktion der Zwangssymptomatik von Aufnahme zu Entlassung zeigen. Es gibt bereits erste Hinweise darauf, dass die Bereitschaft, sich im Rahmen von Expositionen unangenehmen Gefühlen, Gedanken und körperlichen Empfindungen zu stellen, mit dem Behandlungserfolg zusammenhängt (Reid et al., 2017). Dieser Zusammenhang sollte in weiteren Studien überprüft werden.

2.1.4 Effekte videokonferenzbasierter Exposition

Die Behandlung in einer psychosomatischen Klinik findet außerhalb des regulären Alltags der Patienten statt. Daher stellt sich immer die Frage, ob sich die Therapieerfolge, die im Rahmen der (teil-)stationären Behandlung erzielt wurden, auf den Alltag zuhause übertragen lassen. Um dieser Frage Rechnung zu tragen, könnte eine geeignete Intervention der Einsatz videokonferenzbasierter Expositionsbehandlungen im häuslichen Umfeld der Patienten zusätzlich zur (teil-)stationären Behandlung sein. In einer Studie von Vogel et al. (2014) wurden insgesamt 30 Patienten untersucht und in drei gleich große Gruppen eingeteilt. Jeweils ein Drittel der Patienten erhielt eine videokonferenzbasierte Expositionsbehandlung, ein Drittel erhielt Zugang zu einem Selbsthilfemanual und ein Drittel wurde einer Wartelistenkontrollbedingung zugeordnet (Vogel et al., 2014). In der Studie konnte gezeigt werden, dass die Patienten, die eine videokonferenzbasierte Expositionsbehandlung erhielten, eine substanziell höhere Reduktion der Symptomatik der Zwangsstörung aufwiesen, als die Patienten, die den anderen beiden Bedingungen zugeordnet wurden (Vogel et al., 2014). Eine Stärke dieser Studie

ist sicherlich die randomisiert-kontrollierte Zuordnung der Studienbedingungen, jedoch ist die Stichprobengröße mit insgesamt 30 Teilnehmenden als gering einzustufen. Somit sollte die videokonferenzbasierte Expositionsbehandlung auch in größeren Stichproben und anderen Behandlungskontexten wie beispielsweise klinischen Routinebedingungen untersucht werden (DGPPN, 2022).

2.1.5 Effekte akzeptanzbasierter Strategien bei Exposition

Ein weiterer Ansatz, der im Rahmen der Expositionsbehandlung bei Patienten mit Zwangsstörung zum Einsatz kommen kann, basiert auf der Akzeptanz- und Commitment-Therapie (ACT). ACT ist als eine Bewegung im Rahmen der KVT zu betrachten, aber verfolgt einen stärker erfahrungsorientierten und kontextbezogenen Ansatz als die reine KVT (Hayes et al., 2006; Kolar et al., 2023). ACT umfasst sechs psychologische Prinzipien, die darauf abzielen, die Flexibilität im Verhalten zu unterstützen (Hayes et al., 2006; Kolar et al., 2023). Die sechs Prinzipien sind die folgenden: Akzeptanz, Defusion, das Selbst als Kontext, Kontakt mit dem gegenwärtigen Moment, Werte und engagiertes Handeln (Hayes et al., 2006; Kolar et al., 2023). Es gibt bereits einige Fallstudien, deren Ergebnisse darauf hinweisen, dass die Kombination aus Exposition mit Reaktionsverhinderung und ACT die Zwangssymptomatik reduziert (Capel et al., 2023; Laurito et al., 2022). Dennoch fehlen bisher experimentelle Studien zu den unmittelbaren Auswirkungen von auf ACT basierenden Strategien, die während der Exposition genutzt werden (Kolar et al., 2023).

2.2 Methode

Diese Dissertation umfasst vier Originalstudien sowie eine systematische Übersichtsarbeit und Meta-Analyse. Die Patientendaten, die im Rahmen der vier Primärstudien analysiert wurden, stammen aus der Schön Klinik Roseneck in Prien am Chiemsee, Deutschland. Die Behandlung in dieser Klinik entspricht den Empfehlungen der deutschen S3-Leitlinie Zwangsstörungen (DGPPN, 2022). Die Patienten erhalten eine multimodale Behandlung, die eine große Anzahl an Interventionen umfasst. Dies sind störungsspezifische Einzel- und Gruppentherapiesitzungen sowie, je nach Indikation, auch andere Behandlungselemente wie beispielsweise psychopharmakologische Medikation.

2.3 Ergebnisse der Studien

2.3.1 Effekte (teil-)stationärer Behandlung auf Zwangssymptome

In dieser Studie wurden die Effekte (teil-)stationärer Behandlung auf Zwangssymptome im Rahmen einer systematischen Übersichtsarbeit und Meta-Analyse erfasst. Dafür wurden die drei Datenbanken PubMed, PsycINFO und Web of Science systematisch nach den PRISMA-Richtlinien durchsucht. Um die in Kapitel 2.1.1 beschriebene Forschungslücke zu adressieren, wurden Studien eingeschlossen, in denen die Zwangssymptomatik mit mindestens einem der folgenden Instrumente erfasst wurde: Y–BOCS Selbstberichts- oder Interview-Version, Children's Yale–Brown Obsessive Compulsive Scale, Obsessive–Compulsive Inventory–Revised und Dimensional Obsessive–Compulsive Scale. Es konnten 43 Studien identifiziert und in die systematische Übersichtsarbeit und Meta-Analyse eingeschlossen werden. In allen eingeschlossenen Studien wurde KVT mit Exposition und Reaktionsverhinderung eingesetzt. Die Zwangssymptomatik nahm von Aufnahme zu Entlassung mit einer großen Effektstärke ($g = -1{,}59$) signifikant ab. Die Zwangssymptomatik veränderte sich von Entlassung zur Follow-Up Messung nicht signifikant. Aufenthaltsdauer, Alter, Geschlecht und Land, in dem die Studie durchgeführt wurde, moderierten den Behandlungseffekt von Aufnahme zu Entlassung nicht. Das genutzte Instrument zur Erfassung der Zwangssymptomatik moderierte den Behandlungseffekt von Aufnahme zu Entlassung, das heißt, der Behandlungseffekt war in Studien, in denen die Interview-Version der Y–BOCS genutzt wurde, größer als in Studien, in denen Selbstberichtsinstrumente genutzt wurden. Die systematische Übersichtsarbeit und Meta-Analyse zeigte, dass (teil-)stationäre Behandlung für Menschen mit Zwangsstörung eine aussichtsreiche Therapieoption darstellt. Die erzielten Erfolge können auch über einen Zeitraum von bis zu zwei Jahren nach Entlassung aufrechterhalten werden.

2.3.2 Dauer von Alltagsaktivitäten

Dies ist die erste Studie, in der die Dauer von Alltagsaktivitäten bei Menschen mit Zwangsstörung erhoben und mit einer Kontrollgruppe bestehend aus Menschen ohne Zwangsstörung verglichen wurde. Für diese Studie wurde ein Selbstberichtsfragebogen erstellt, den 299 Menschen mit Zwangsstörung ausfüllten. Sie gaben an, wie viel Zeit in Minuten sie für jeweils 13 Aktivitäten des alltäglichen

Lebens wie beispielsweise Einkaufen oder Duschen benötigen. Die angegebenen Zeitspannen wurden mit den Angaben einer Kontrollgruppe, die aus 300 alters- und geschlechtsgleichen Personen ohne Zwangsstörung bestand, verglichen. Ein Großteil der Menschen mit Zwangsstörung gab an, beim Verlassen und Putzen der Wohnung, beim Einkaufen, beim Wechseln der Kleidung und beim Duschen mit und ohne Haarewaschen Zwangsgedanken und/oder Zwangshandlungen zu erleben. Personen mit Zwangsstörung, die während einer bestimmten Aktivität des alltäglichen Lebens Zwangsgedanken und/oder Zwangshandlungen erlebten, aber nicht diejenigen Personen mit Zwangsstörung, die während dieser Aktivitäten keine Zwangsgedanken und/oder Zwangshandlungen erlebten, gaben an, dass sie für zehn der 13 Aktivitäten länger benötigen als Personen ohne Zwangsstörung. Die Ergebnisse der Studie zeigten außerdem, dass ein schwacher, aber signifikanter Zusammenhang zwischen der Dauer der Aktivitäten und einem höheren Schweregrad der Zwangssymptomatik besteht. Diese Studie konnte zeigen, dass die Dauer von Aktivitäten des alltäglichen Lebens eher davon abhängt, ob Menschen mit Zwangsstörung während einer bestimmten Aktivität Zwangsgedanken und/oder Zwangshandlungen erleben, aber weniger davon, ob eine Zwangsstörung im Allgemeinen diagnostiziert wurde.

2.3.3 Bereitschaft zur Konfrontation als möglicher Prädiktor

In dieser Studie wurde untersucht, ob eine höhere Bereitschaft, sich bei Expositionen unangenehmen Gefühlen, Gedanken und körperlichen Empfindungen zu stellen, ein besseres Behandlungsergebnis vorhersagt. Die Stichprobe dieser Studie bestand sowohl aus erwachsenen als auch aus jugendlichen Personen mit Zwangsstörung. Entgegen der Erwartungen sagte die Bereitschaft, sich unangenehmen Gefühlen, Gedanken und körperlichen Empfindungen zu stellen, das Behandlungsergebnis nicht vorher. Der Effekt der Bereitschaft, sich unangenehmen Gefühlen, Gedanken und körperlichen Empfindungen zu stellen, auf das Behandlungsergebnis blieb auch nach Kontrolle von Komorbiditäten, Alter, Geschlecht, Aufenthaltsdauer und antidepressiver Medikation nicht signifikant und wurde nicht durch diese Variablen moderiert. Die Ergebnisse verdeutlichen, dass eine niedrigere Bereitschaft zu Beginn der stationären Behandlung, sich unangenehmen Gefühlen, Gedanken und körperlichen Empfindungen zu stellen, das Behandlungsergebnis bei Entlassung nicht negativ beeinflusst. Das bedeutet, dass

Patienten, die anfangs angeben, nicht bereit zu sein, sich im Rahmen von Expositionen ihren unangenehmen Gefühlen, Gedanken und körperlichen Empfindungen zu stellen, erfreulicherweise dennoch eine starke Reduktion der Zwangssymptomatik von Aufnahme zu Entlassung erreichen können.

2.3.4 Effekte videokonferenzbasierter Exposition

In dieser Studie wurden die Effekte videokonferenzbasierter Expositionen in klinischen Routinebedingungen untersucht. Dafür erhielten 64 stationär behandelte Patienten mit Zwangsstörung eine therapeutisch angeleitete, videokonferenzbasierte Expositionssitzung im häuslichen Umfeld. Die Kontrollgruppe bestand aus 64 alters- und geschlechtsgleichen Patienten mit Zwangsstörung, die ebenfalls stationär behandelt wurden, jedoch keine therapeutisch angeleitete, videokonferenzbasierte Expositionssitzung zuhause erhielten. Die Ergebnisse der Studie zeigten, dass die Patienten, die eine Expositionssitzung zuhause durchliefen, eine stärkere Verringerung der Zwangssymptomatik von Aufnahme zu Entlassung zeigten als die Personen der Kontrollgruppe. Zudem berichteten die Patienten in der Experimentalgruppe vor der Expositionssitzung von einer hohen Behandlungserwartung in Bezug auf die Intervention. Nach der Expositionssitzung berichteten die Patienten der Experimentalgruppe von einer positiven Stimmung und Arbeitsbeziehung während der Intervention sowie über einen reibungslosen Ablauf dieser. Die Befunde dieser Studie zeigen, dass therapeutisch angeleitete, videokonferenzbasierte Expositionssitzungen das Behandlungsergebnis einer multimodalen stationären Behandlung der Zwangsstörung noch verbessern können.

2.3.5 Effekte akzeptanzbasierter Strategien bei Exposition

Diese experimentelle Studie untersuchte die Effekte akzeptanzbasierter Strategien während der Exposition gegenüber störungsrelevanten Reizen bei 53 Personen mit Zwangsstörung. Diese wurden instruiert, ekelauslösende Bilder entweder fünf Sekunden lang passiv zu betrachten (neutrale Bedingung), ihre dabei entstehenden Gefühle anzunehmen und zu akzeptieren (Akzeptanzbedingung) oder ihre Gefühle zu verstärken (Expositionsbedingung). Die Ergebnisse zeigten, dass die Akzeptanzbedingung im Vergleich zur neutralen Bedingungen zu einer

höheren Akzeptanz und zu geringerem Unwohlsein in Bezug auf die wahrgenommenen Gefühle führte. Die Akzeptanzbedingung führte, jedoch nur im Vergleich zur Expositionsbedingung, zu geringer ausgeprägten Zwangsgedanken und einem als niedriger wahrgenommen Impuls, Zwangshandlungen auszuführen. Eine wichtige Einschränkung dieser Studie ist, dass, aufgrund der kurzen Dauer der Expositionsbedingung, lediglich die frühe Phase einer realen Exposition nachgeahmt werden konnte. Somit stellt diese Studie zwar einen Anhaltspunkt dafür dar, dass akzeptanzbasierte Strategien während der Expositionsphase unmittelbar die Akzeptanz unangenehmer Gefühle erhöhen können, jedoch muss geprüft werden, ob diese Ergebnisse auch auf andere Stimuli und Formen von Zwängen übertragen werden können.

2.4 Synthese

In dieser Dissertation wurde gezeigt, dass (teil-)stationäre Behandlungsprogramme hocheffektiv sind. Die große Effektstärke zeigt sich unabhängig von verschiedenen Charakteristika der Patienten wie beispielsweise dem Alter, dem Geschlecht oder der Bereitschaft, sich im Rahmen von Expositionen unangenehmen Gefühlen, Gedanken und körperlichen Empfindungen zu stellen. Ein Aspekt, dem potenziell in der Behandlung von Patienten mit Zwangsstörung mehr Beachtung geschenkt werden sollte, ist die Erfassung der Dauer von Alltagsaktivitäten. Dadurch kann die Festlegung der Bereiche, in denen funktionelle Einschränkungen vorliegen, erleichtert werden. Somit können Expositionen noch besser geplant und durchgeführt werden. Zudem wurden in dieser Dissertation vielversprechende Ansätze (akzeptanzbasierte Strategien sowie therapeutisch angeleitete, videokonferenzbasierte Expositionen) untersucht, die die Effektivität von Expositionen und somit (teil-)stationären Behandlungen darüber hinaus noch steigern können. Dennoch sollten besonders die genannten Interventionen in weiteren Studien evaluiert werden.

3. Zusammenfassung

Die Zwangsstörung ist eine psychische Erkrankung, die durch das Auftreten von Zwangsgedanken, Zwangshandlungen oder beidem gekennzeichnet ist. Die Therapie der ersten Wahl ist eine störungsspezifische Kognitive Verhaltenstherapie (KVT) mit Exposition und Reaktionsverhinderung. Häufig erfolgt die KVT bei der Zwangsstörung ambulant, jedoch müssen manche Betroffene auch stationär behandelt werden. Die Evidenzlage zu (teil-)stationär behandelten Patienten ist noch als eher gering einzuordnen. Aus diesem Grund wurden in dieser Dissertation das Behandlungsergebnis sowie die Prädiktoren und Moderatoren des Behandlungsergebnisses von und bei Personen mit Zwangsstörung untersucht, die eine (teil-)stationäre Behandlung erhielten.

In der ersten Studie wurden die Effekte (teil-)stationärer Behandlung auf Zwangssymptome im Rahmen einer systematischen Übersichtsarbeit und Meta-Analyse erfasst. In allen 43 Studien wurde KVT mit Exposition und Reaktionsverhinderung eingesetzt. Die meta-analytischen Berechnungen zeigten, dass die Zwangssymptome im Verlauf von Aufnahme zu Entlassung signifikant und mit einer großen Effektstärke abnahmen. Die Zwangssymptome veränderten sich von Entlassung zur Follow-Up Messung nicht signifikant. Aufenthaltsdauer, Alter, Geschlecht und Land moderierten den Behandlungseffekt von Aufnahme zu Entlassung nicht. Die Veränderungen der Zwangssymptome von Aufnahme zu Entlassung waren in den Studien, in denen die Y–BOCS Interview-Version verwendet wurde, größer als in Studien, in denen Selbstberichtsfragebögen verwendet wurden.

In der zweiten Studie wurde die Dauer von 13 Alltagsaktivitäten bei 299 Menschen mit Zwangsstörung erfasst und mit einer Kontrollgruppe aus 300 alters- und geschlechtsgleichen Menschen ohne Zwangsstörung verglichen. In der Studie gaben Personen mit Zwangsstörung, die während einer bestimmten Aktivität des alltäglichen Lebens Zwangsgedanken und/oder Zwangshandlungen erlebten, aber nicht diejenigen, die während dieser Aktivitäten keine Zwangsgedanken und/oder Zwangshandlungen erlebten, an, dass sie für zehn der 13 Aktivitäten länger benötigen als Personen ohne Zwangsstörung. Die Studie zeigte zudem einen schwachen, aber signifikanten Zusammenhang zwischen der Dauer der Aktivitäten und einem höheren Schweregrad der Zwangssymptomatik.

In der dritten Studie wurde analysiert, ob eine höhere Bereitschaft, sich bei Expositionen unangenehmen Gefühlen, Gedanken und körperlichen Empfindungen zu stellen, ein besseres Behandlungsergebnis vorhersagt. Entgegen den Erwartungen sagte die Bereitschaft, sich unangenehmen Gefühlen, Gedanken und körperlichen Empfindungen zu stellen, das Behandlungsergebnis nicht vorher. Dieser Effekt blieb auch nach Kontrolle von Komorbiditäten, Alter, Geschlecht, Aufenthaltsdauer und antidepressiver Medikation nicht signifikant und wurde nicht durch diese Variablen moderiert.

In der vierten Studie erhielten 64 stationär behandelte Patienten mit Zwangsstörung eine therapeutisch angeleitete, videokonferenzbasierte Exposition im häuslichen Umfeld zusätzlich zur stationären Behandlung. Die Kontrollgruppe bestand aus 64 alters- und geschlechtsgleichen Patienten mit Zwangsstörung, die ebenfalls stationär behandelt wurden, aber keine Exposition zuhause erhielten. Die Ergebnisse der Studie zeigten, dass die Patienten, die eine Expositionssitzung im häuslichen Umfeld erhielten, eine signifikant stärkere Reduktion der Zwangssymptomatik aufwiesen als die Patienten der Kontrollgruppe.

In der fünften Studie sollten 53 Personen mit Zwangsstörung ekelauslösende Bilder entweder fünf Sekunden lang passiv betrachten (neutrale Bedingung), die dabei entstehenden Gefühle akzeptieren (Akzeptanzbedingung) oder ihre Gefühle verstärken (Expositionsbedingung). Die Studie zeigte, dass die Akzeptanzbedingung im Vergleich zur neutralen Bedingung zu einer höheren Akzeptanz und zu geringerem Unwohlsein in Bezug auf die wahrgenommenen Gefühle führte. Die Akzeptanzbedingung führte, jedoch nur im Vergleich zur Expositionsbedingung, zu geringer ausgeprägten Zwangsgedanken und einem als niedriger wahrgenommen Impuls, Zwangshandlungen auszuführen.

Diese Dissertation zeigt, dass (teil-)stationäre Behandlungsprogramme hochwirksam sind und dass diese Effekte unabhängig von bestimmten Patientenmerkmalen wie Alter, Geschlecht oder der Bereitschaft, sich unangenehmen Gefühlen, Gedanken und körperlichen Empfindungen zu stellen, sind. Darüber hinaus könnte die Erfassung der Dauer von Alltagsaktivitäten dazu beitragen, die Bereiche des Lebens zu identifizieren, in denen Personen mit Zwangsstörung funktionelle Beeinträchtigungen aufweisen. Eine Modifikation der

Expositionssitzungen durch zusätzliche Videokonferenzsitzungen zuhause oder die Anwendung akzeptanzbasierter Strategien könnte den Effekt der (teil-)stationären Behandlung weiter steigern.

4. Abstract

Obsessive–compulsive disorder (OCD) is a mental disorder characterized by the occurrence of obsessions, compulsions, or both. The treatment of choice is a disorder-specific cognitive-behavioral therapy (CBT) with exposure and response prevention. Persons with OCD often receive outpatient treatment but some persons also require hospital treatment. The evidence on (partial) hospital treatment is still rather limited. For this reason, this dissertation aimed to examine the treatment outcome of as well as predictors and moderators of treatment outcome in patients who received (partial) hospital treatment.

In the first study, the effects of (partial) hospital treatment on obsessive–compulsive symptoms were assessed in a systematic review and meta-analysis. CBT with exposure and response prevention was administered in all 43 studies. The meta-analytic calculations showed that obsessive–compulsive symptoms decreased significantly from admission to discharge with a large effect size. Obsessive–compulsive symptoms did not change from discharge to follow-up measurement. Length of stay, age, gender, and country did not moderate the treatment effect from admission to discharge. Changes in obsessive–compulsive symptoms from admission to discharge were larger in studies that used the Y–BOCS interview than in studies that used self-report measures.

In the second study, the duration of 13 daily life activities was assessed in 299 persons with OCD and compared with a control group consisting of 300 age- and gender-matched persons without OCD. In this study, persons with OCD who reported to experience obsessions and/or compulsions during a particular daily life activity, but not those who did not report to experience obsessions and/or compulsions during this activity, reported higher durations than persons without OCD in ten of the 13 activities. The study also showed weak but significant correlations between the duration of daily life activities and a higher obsessive–compulsive symptom severity.

In the third study, it was analyzed whether a higher willingness to experience unpleasant thoughts, emotions, and bodily sensations (WTE) predicted a better treatment outcome. Contrary to expectations, it did not. The effect of WTE on

treatment outcome remained non-significant, even after controlling for comorbidities, age, gender, length of stay, and antidepressant medication and was not moderated by these variables.

In the fourth study, 64 persons with OCD received a therapeutically-guided, videoconference-based exposure session at home in addition to hospital treatment. The control group consisted of 64 age- and gender-matched persons with OCD who also received hospital treatment but no exposure session at home. The results of the study showed that those patients who received a therapeutically-guided, videoconference-based exposure session had a significantly higher reduction in obsessive–compulsive symptoms than persons in the control group.

In the fifth study, 53 persons with OCD were asked to either passively view disgust-inducing images for five seconds (neutral condition), to accept arising feelings (acceptance condition), or to intensify their feelings (exposure condition). The study showed that the acceptance condition led to higher acceptance and lower unpleasantness of patients' current feelings compared to the neutral condition and to lower strength of obsessions and urge to perform compulsions but only when compared to the exposure condition.

This dissertation shows that (partial) hospital treatment programs are highly effective and that these effects are independent of certain patient characteristics such as age, gender, or WTE. In addition, assessing the duration of daily life activities could contribute to an easier identification of areas in which persons with OCD are functionally impaired. Modifying exposure sessions by adding videoconference-based sessions at home or incorporating acceptance-based strategies might further increase effects of (partial) hospital treatment.

5. Artikel I

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Effects of inpatient, residential, and day-patient treatment on obsessive–compulsive symptoms in persons with obsessive–compulsive disorder: A systematic review and meta-analysis

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ABSTRACT

Introduction: Patients with severe or treatment-refractory obsessive–compulsive disorder (OCD) often need an extensive treatment which cannot be provided by outpatient care. Therefore, we aimed to estimate the effects and their moderators of inpatient, residential, or day-patient treatment on obsessive–compulsive symptoms in patients with OCD.

Methods: PubMed, PsycINFO, and Web of Science were systematically screened according to the PRISMA guidelines. Studies were selected if they were conducted in an inpatient, residential, or day-patient treatment setting, were using a number of pre-defined instruments for assessing OCD symptom severity, and had a sample size of at least 20 patients.

Results: We identified 43 eligible studies in which inpatient, residential, or day-patient treatment was administered. The means and standard deviations at admission, discharge, and—if available—at follow-up were extracted. All treatment programs included cognitive-behavioral treatment with exposure and response prevention. Only one study reported to not have used psychopharmacological medication. Obsessive–compulsive symptoms decreased from admission to discharge with large effect sizes ($g = -1.59$, 95%CI [−1.76; −1.41]) and did not change from discharge to follow-up ($g = 0.06$, 95%CI [−0.09; 0.21]). Length of stay, age, sex, and region did not explain heterogeneity across the studies but instrument used did: effects were larger for clinician-rated interviews than for self-report measures.

Conclusions: Persons with OCD can achieve considerable symptom reductions when undertaking inpatient, residential, or day-patient treatment and effects are—on average—maintained after discharge.

1. Introduction

Obsessive–compulsive disorder (OCD) is a debilitating and disabling mental disorder which affects approximately 2% of the general population (Murphy et al., 2010). The disorder is characterized by the occurrence of obsessions and/or compulsions (American Psychiatric Association, 2013; World Health Organization, 1993). Obsessions are repetitive and persistent thoughts, images, or impulses that are intrusive and mostly perceived as unpleasant and disturbing. Compulsions are recurrent acts which are often performed to neutralize obsessions and, therefore, perceived as relieving. OCD frequently has severe consequences on the daily functioning and quality of life of affected persons as well as their friends and family members (Eisen et al., 2006; Hauschildt et al., 2010; Macy et al., 2013). If not treated adequately, the disorder has a chronic course in many cases (Skoog and Skoog, 1999).

According to international guidelines for the treatment of OCD, cognitive-behavioral therapy (CBT) with exposure and response prevention (ERP) is the first-line, evidence-based treatment for the disorder (American Psychiatric Association, 2013; DGPPN, 2022; National Collaborating Centre for Mental Health, 2006; Voderholzer et al., 2022).

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ERP is a crucial element in CBT for patients with OCD and comprises the repeated and prolonged confrontation with stimuli provoking obsessions while refraining from compulsions which results in breaking the vicious cycle of OCD through a process of habituation (Abramowitz et al., 2009; Foa and Kozak, 2004; Himle and Franklin, 2009) and/or inhibitory learning (Arch and Abramowitz, 2015; Craske et al., 2014). CBT comprising ERP is considered highly effective in treating OCD with large effect sizes (Öst et al., 2015).

If suitable guideline-based outpatient treatment is not available or the patient does not respond to it, a higher-threshold treatment, such as inpatient treatment, may be required (DGPPN, 2022). Inpatient treatment is the highest level of stepped care and may include various treatment elements besides CBT and ERP (e.g., individual group and family therapy sessions, occupational therapy, sport therapy, and psychopharmacological medication; Veale et al., 2016a). Besides inpatient treatment, there is also residential treatment which offers therapeutic care throughout the day but not at night and is one step below psychotherapeutic treatment in an inpatient setting (Veale et al., 2016b). To be eligible for residential treatment, patients must not be suicidal and need to be able to demonstrate a certain degree of self-care (Veale et al., 2016a). Another step below residential treatment is day-patient treatment which shows considerable similarity to residential treatment. Yet, the main difference between these two treatment settings is that patients in residential treatment stay overnight, while patients in day-patient treatment are only present in the clinic during the day and go home in the evening (Veale et al., 2016b).

However, as inpatient, residential, and day-patient treatment are intensive therapy options, it must be considered carefully whether such an intervention is necessary and promising for patients with OCD. In addition to the advantages of such an intensive treatment, it can also have disadvantages. First, inpatient, residential, and day-patient treatment are more expensive than outpatient treatment and second, patients are taken out of their homes which can limit the generalizability of treatment effects and increase the likelihood of relapse after discharge (Veale et al., 2016a). Yet, there are several primary studies showing that especially inpatient treatment for OCD comes along with large effect sizes for changes in obsessive–compulsive symptoms from admission to discharge and, therefore, the benefits may outweigh the costs (Boschen et al., 2008; Herzog et al., 2022).

To the best of our knowledge, there is only one systematic review and meta-analysis having examined the effects of inpatient, residential, or day-patient treatment from admission to discharge across several studies (Veale et al., 2016a). Specifically, Veale et al. 2016b aimed to determine the effect size of inpatient, residential, or day-patient treatment programs in persons with OCD and found a large improvement ($g = 1.87$) between admission and discharge. Yet, only studies which used the Yale–Brown Obsessive Compulsive Scale (Y–BOCS) interview version and no studies with follow-up measures were included in this systematic review and meta-analysis. To get an even broader picture of the effects of inpatient, residential, and day-patient treatment on obsessive–compulsive symptoms, it is necessary to include studies in a systematic review and meta-analysis in which data are collected with other instruments as well (e.g., the Y–BOCS self-report or the Obsessive–Compulsive Inventory–Revised), which may have higher feasibility in clinical practice. In addition, follow-up data collected after discharge from inpatient, residential, and day-patient treatment should be included to gain insights on whether such an intensive and expensive treatment is effective in the long run. Conducting moderator analyses allows to see whether inpatient, residential, or day-patient treatment is particularly effective under several conditions.

Thus, to expand knowledge on this topic, the current systematic review and meta-analysis aimed to assess the effects of inpatient, residential, or day-patient treatment on obsessive–compulsive symptoms (as measured with several self-report questionnaires and the Y–BOCS interview version) in persons with OCD from admission to discharge as well as from discharge to follow-up. Furthermore, it was aimed to assess the impact of other variables (i.e., length of stay, age, sex, and region) on the effect of treatment from admission to discharge to explain heterogeneity across the studies included.

2. Method

2.1. Eligibility criteria

A protocol was developed before literature search and registered with PROSPERO before data collection (CRD42023408323). We included studies both randomized, quasi-randomized, and uncontrolled studies assessing the effects of inpatient, residential, or day-patient treatment on compulsive–compulsive symptoms in children, adolescents, or adults with OCD. Assessment of obsessive–compulsive symptoms had to be based on self-report or interview measures at admission, discharge, and/or follow-up using the following measures: Yale–Brown Obsessive Compulsive Scale (Y–BOCS self-report or interview version; Baer, 1991; Goodman et al., 1991), Children's Yale–Brown Obsessive Compulsive Scale (CY-BOCS; Scahill et al., 1997), Obsessive–Compulsive Inventory–Revised (OCI–R; Foa et al., 2002), and Dimensional Obsessive–Compulsive Scale (DOCS; Abramowitz et al., 2010). Besides studies in English—which is the primary language for scientific articles—we additionally included studies in our native language German. Studies were excluded if psychopharmacological treatment only was applied or sample sizes were smaller than 20 persons.

2.2. Search strategy

This meta-analysis was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A two-part comprehensive search strategy based on previously published systematic reviews and meta-analyses as well as our expertise was developed in order to cover the vast number of studies which assessed obsessive–compulsive symptoms in inpatient, residential, or day-patient treatment at admission, discharge, and/or follow-up in children, adolescents, and adults with OCD. Searches were run between 16th and March 17, 2023 in PubMed (NCBI), PsycINFO (Ovid), and Web of Science (Clarivate Analytics). Furthermore, a backward search was conducted in order to discover further relevant studies by reviewing the reference lists of eligible studies for further potentially eligible reports. We included the following types of publications: clinical studies, (randomized controlled) clinical trials (phase I, II, III, and IV), comparative studies, evaluation studies, multicenter studies, observational studies, and validation studies. We did not include grey literature, such as dissertations, essays, or conference abstracts.

The following search terms were used for electronic data base search: ("obsessive–compulsive disorder" [title/abstract] OR "obsessive-compulsive disorder" [title/abstract] OR "obsessive compulsive disorder" [title/abstract] OR "OCD" [title/abstract] AND "inpatients [title/abstract] OR "day patients" [title/abstract] OR "daypatients" [title/abstract] OR "inpatient treatment" [title/abstract] OR "in-patient treatment" [title/abstract] OR "residential treatment" [title/abstract] OR "day patient treatment" [title/abstract] OR "day-patient treatment" [title/abstract] OR "day patient care" [title/abstract] OR "day-patient care" [title/abstract] OR "day care" [title/abstract] OR "daycare" [title/abstract] OR "inpatient care" [title/abstract] OR "in-patient care" [title/abstract] OR "stationary treatment" [title/abstract] OR "stationary care" [title/abstract] OR "hospital treatment" [title/abstract] OR "hospital care" [title/abstract] OR "intensive residential treatment" [title/abstract] OR "IRT" [title/abstract] OR "day patient program" [title/

abstract] OR "day-patient program" [title/abstract] OR "treatment" [title/abstract] OR "therapy" [title/abstract]).[1]

2.3. Study selection and data extraction

Records were managed with EndNote (Version 20.4), Microsoft Excel (Version 16.70), and Rayyan (Ouzzani et al., 2016) and were identified in a two-step approach. First, duplicates were excluded and the abstracts and titles of remaining records were screened. Second, full texts of eligible studies were screened and data originating from selected studies were collected by EMZ and three research assistants with sufficient experience by using an electronic data extraction form specifically developed in accordance with the research question. The following data from each eligible study were extracted: year of publication, sample sizes at admission, discharge, and follow-up (if applicable), mean age, percentage of males and females, type of treatment, country, period covered, length of stay, length of follow-up period (if applicable), instrument used, means and standard deviations at admission, discharge, and follow-up (if applicable) as well as type of psychopharmacological treatment if applied. If multiple instruments including the Y–BOCS were used in a study, the Y–BOCS was preferred. If multiple instruments including OCI–R but not Y–BOCS were used in a study, OCI–R was preferred. If multiple instruments including DOCS but not Y–BOCS or OCI–R were used, DOCS was preferred. For studies that examined children and adolescents only, the CY–BOCS was used. In case of multiple follow-up measurements, data of the latest follow-up measurement were extracted.

If data necessary for calculation of effect sizes could not be accessed in the paper, the corresponding authors were contacted by EMZ via email in order to obtain either the full text or additional information. Such studies were excluded if no response was received within two weeks. Any ambiguous decisions in the study selection and data extraction process were discussed among EMZ and the three research assistants. Authors were not blinded to any aspect of identified studies during the selection and data collection process.

2.4. Risk of bias

Risk of bias in individual studies was assessed with the "Risk Of Bias In Non-randomised Studies – of Interventions" (ROBINS–I) tool (Sterne et al., 2016). The ROBINS–I tool comprises the following seven categories: bias due to confounding, bias due to selection of participants, bias in classification of interventions, bias due to deviations from intended interventions, bias due to missing data, bias in measurement of outcomes, and bias in selection of the reported outcomes. For each category, studies are rated as low, moderate, and serious. The risk of bias figure was created by using the *robvis* package (McGuinness and Higgins, 2021).

Publication bias was assessed by three procedures for the effect from admission to discharge. We did not assess publication bias for the effect from discharge to follow-up as the number of studies included was too small. First, a funnel plot was created which plots the effect size of each study against the standard error of the effect sizes. Publication bias is indicated by asymmetries in the plot. Second, the rank correlation test for funnel plot asymmetry (which computes a rank-order correlation between the effect sizes and their precision) was calculated (Begg and Mazumdar, 1994). Third, we applied the WAAP-WLS (a hybrid of weighted average of the adequately powered studies and weighted least squares) procedure which iteratively removes studies with insufficient power to detect the meta-analytic effect size (cf., Bartoš et al., 2022). We did not apply the PET-PEESE procedure (which corrects for the correlation between effect sizes and standard errors or effect sizes and standard errors squared; cf., Bartoš et al., 2022) as it performs badly when the between-study heterogeneity is substantial (Harrer et al., 2021; Stanley, 2017).

2.5. Statistical analyses

If at least three eligible studies were available, meta-analyses were performed. Analyses were conducted using *R* version 4.2.1 (RCore Team, 2022), *RStudio* version 2022.07.1 (RStudio Team, 2022), and *JASP* version 0.16.4.0 (JASP Team, 2022). For conducting meta-analyses, the outcomes in Y–BOCS, CY–BOCS, OCI–R, and DOCS of individual studies were transferred to standardized mean differences and combined to calculate a pooled effect size and a 95% confidence interval. Using the *meta* (Schwarzer and Schwarzer, 2012) and *dmetar* (Harrer et al., 2021) packages in *R*, two separate meta-analyses were conducted, one for calculating the pooled effect size for changes from admission to discharge and one for calculating the pooled effect size for changes from discharge to follow-up. Random-effects models were used as they assume that the observed estimates of treatment effect can vary across studies because of real differences in the treatment effect in each study as well as sampling variability (Borenstein et al., 2010). As pooled effect size, we calculated Hedges' *g* with negative numbers representing reductions in OCD symptom severity measures. Effects were pooled by using the inverse variance method and—given its robust performance in continuous outcome data—the between-study variance (τ^2) was estimated by using the restricted maximum-likelihood estimator (Harrer et al., 2021). The Knapp–Hartung adjustments were applied to reduce the risk of a false positive result (Harrer et al., 2021). Prediction intervals were calculated to estimate the range into which the expected effects of future studies fall based on the present evidence (Harrer et al., 2021).

To assess the impact of length of stay, age, sex, region (i.e., Europe versus USA, as there were only few studies from other world regions), and instrument used (i.e., self-report versus interview versions) and, thus, explain heterogeneity across the studies included, we conducted meta-regressions for effects of changes from admission to discharge. Moderator analyses were not conducted for the effects of changes from discharge to follow-up as there were only few studies available. The *R* code and data which can be used to reproduce all analyses are available at https://osf.io/hcf3g/.

3. Results

3.1. Study selection

The search yielded a total of 2443 studies. After removing duplicates (n = 570), titles and abstracts of the remaining studies found in the database search (n = 1873) were independently screened by EMZ, which lead to exclusion of 1744 records. In the next step, 129 studies were sought for retrieval, six of which could not be retrieved. Hence, 123 records were assessed for eligibility by screening full texts by EMZ, which lead to exclusion of 82 studies. Adding the two studies found in the second literature search (see Footnote 1) led to a total of 43 studies which were included in the review. Fig. 1 depicts a PRISMA flow chart that includes the reasons for study exclusions.

3.2. Study characteristics

All included studies were non-randomized studies conducted in the USA (n = 22), Germany (n = 12), United Kingdom (n = 4), Norway (n = 1), Czech Republic (n = 1), Australia (n = 1), and India (n = 2). At admission, data of 7878 persons taking part in the included studies were available (median = 103, Range = 23–1595). At discharge, data of 7336 persons were available (median = 102, Range = 23–1595) while at

[1] Based on a comment by a reviewer, we repeated the literature search on 4th of April 2024 by adding the search term "partial hosp* [title/abstract]". We found two additional studies (Bystritsky et al., 1996, 1999), which were included in the systematic review and meta-analysis.

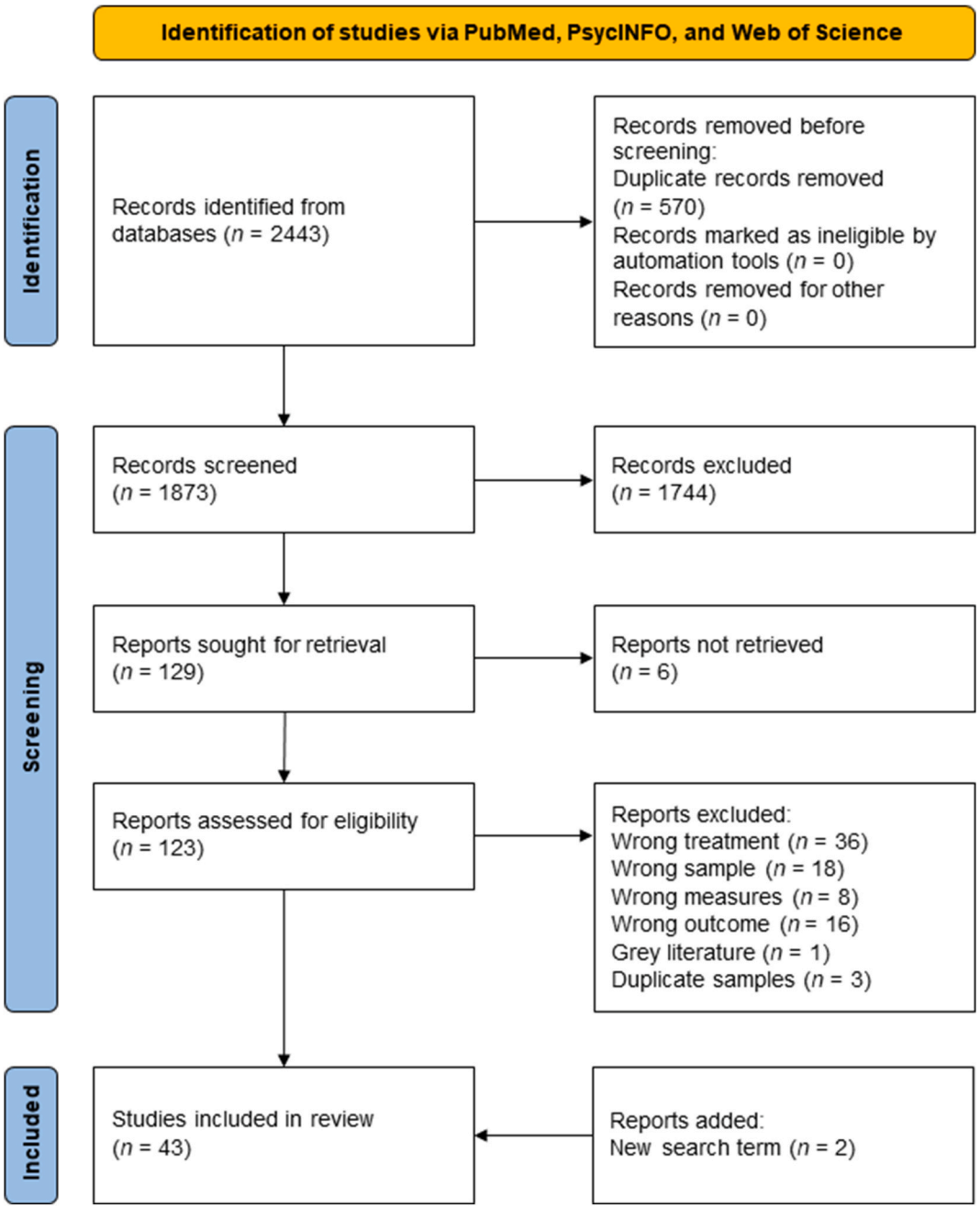

Fig. 1. PRISMA flow diagram.

follow-up, data of 910 persons were available (median = 53, Range = 7–420). In 37 studies (N = 6655; information not available for six studies), 3454 persons (43.84%) were female and 3201 (40.63%) were male. In 40 studies (N = 7301; information not available for 3 studies), mean age was 31.26 years. In eight studies (information not available for 10 studies) only children and adolescents were included. In 39 studies (N = 7214), mean length of stay was 59.74 days (Range = 10.40–135.51). In 22 studies, patients received some form of residential treatment, in 18 studies, patients received some form of inpatient treatment. In three studies, patients received day-patient treatment. Ten studies included follow-up measurements with a mean follow-up period of 11.94 months (Range = 1–24).

Instruments used were Y–BOCS self-report (n = 18), Y–BOCS interview (n = 19), CY–BOCS (n = 4), OCI–R (n = 1), and DOCS (n = 1). Mean Y–BOCS self-report scores were 26.03 (SD = 1.67, Range = 21.27–28.69) at admission, 16.71 (SD = 2.35, Range = 13.08–21.24) at discharge, and 22.40 (no standard deviation or range available as it was only one study) at latest follow-up. Mean Y–BOCS interview scores were 28.64 (SD = 3.06, Range = 24.82–34.80) at admission, 17.05 (SD = 3.00, Range = 12.50–24.37) at discharge, and 17.13 (SD = 2.77, Range = 15.10–22.61) at follow-up. Mean CY–BOCS scores were 25.21 (SD = 0.90, Range = 23.90–25.90) at admission, 13.02 (SD = 1.76, Range = 10.50–14.30) at discharge, and 10.25 (SD = 0.07, Range = 10.20–10.30) at follow-up. In the two single studies that used the OCI–R and DOCS, mean OCI–R scores were 26.66 at admission, 19.50 at discharge, and 18.37 at follow-up, and mean DOCS scores were 32.73 at admission and 16.59 at discharge. Thirty-seven studies reported that psychopharmacological medication was part of their treatment program, one study reported not having used medication throughout treatment, and five studies did not report whether medication was used. Characteristics of the single studies are displayed in Table 1.

Table 1
Characteristics of studies included in the meta-analysis.

Study	Country	Mean (*SD*) length of stay in days	Treatment program	Instrument used	Mean (*SD*) at admission	Mean (*SD*) at discharge	Mean (*SD*) at follow-up	Sample size at admission	Sample size at discharge	Sample size at latest follow-up	Time of latest follow-up in months
Adams et al. (2012)	USA	57.99 (25.84)	Residential treatment program; behavioral and cognitive treatment elements, 25 prolonged exposures per day, cognitive restructuring	Y–BOCS self-report	27.38 (6.53)	15.21 (6.92)	n.a.	160	n.a.	n.a.	n.a.
Balachander et al. (2020)	India	42.70 (n.a.)	Inpatient treatment; intensive CBT (4–5 sessions/week) including psychoeducation, ERP with cognitive restructuring, relapse prevention, therapist-assisted ERP sessions and self-guided ERP sessions, family member stayed in the clinic and was actively involved in therapy	Y–BOCS interview	29.94 (4.50)	18.13 (7.73)	n.a.	420	420	169	24
Björgvinsson et al. (2008)	USA	66.50 (n.a.)	Intensive inpatient treatment program; 90 min of ERP in the morning with staff supervision, self-directed exposures for 60 min; psychoeducational, cognitive-behavioral groups and individualized family interventions	CY–BOCS self-report	23.90 (8.60)	14.30 (9.30)	n.a.	23	23	n.a.	n.a.
Björgvinsson et al. (2013)	USA	43.40 (n.a.)	Residential treatment program; information on treatment provided from Björgvinsson et al. (2008): 90 min of ERP in the morning with staff supervision, self-directed exposures for 60 min; psychoeducational, cognitive-behavioral groups and individualized family interventions	Y–BOCS self-report	26.50 (5.90)	19.00 (7.60)	n.a.	46	46	n.a.	n.a.
Blakey et al. (2017)	USA	n.a.	Residential treatment program; ERP, cognitive restructuring, additional interventions (e.g., behavioral activation for symptoms of depression), non-CBT work (e.g., psychoeducation with family members), process group 1x per week, experiential therapy groups several times per week	DOCS self-report	32.73 (15.07)	16.59 (11.74)	n.a.	187	187	n.a.	n.a.
Boger et al. (2020)	Germany	68.77 (17.30)	Specialist inpatient treatment; CBT, OCD group therapy with main component ERP 300 min per week, individual therapy 50 min per week, mindfulness group therapy and sports therapy or art therapy 100 min per week	OCI–R self-report	26.66 (13.45)	19.50 (12.72)	18.37 (12.86)	68	62	54	6
Boschen et al. (2010)	United Kingdom	135.51 (59.62)	Specialized inpatient treatment; information on treatment provided from Drummond et al. (2007): cognitive-behavioral treatment, medication change, cognitive	Y–BOCS interview	34.74 (4.18)	24.37 (10.62)	n.a.	52	n.a.	n.a.	n.a.

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Table 1 (*continued*)

Study	Country	Mean (*SD*) length of stay in days	Treatment program	Instrument used	Mean (*SD*) at admission	Mean (*SD*) at discharge	Mean (*SD*) at follow-up	Sample size at admission	Sample size at discharge	Sample size at latest follow-up	Time of latest follow-up in months
			reattribution, psychoeducational methods								
Browning et al. (2022)	USA	n.a.	Intensive/residential treatment; intensive CBT-based approach based on ERP, acceptance and commitment therapy, emotion regulation skills, interpersonal effectiveness, daily group therapy	Y–BOCS self-report	25.28 (5.68)	14.25 (6.47)	n.a.	279	279	n.a.	n.a.
Bystritski et al. (1996)	USA	42.00 (n.a.)	Partial hospital treatment; combination of medication, behavior therapy, cognitive restructuring, and psychosocial interventions	Y–BOCS interview	26.9 (4.80)	16.40 (6.80)	15.30 (9.00)	58	n.a.	7	18
Bystritski et al. (1999)	USA	42.00 (n.a.)	Partial hospital treatment; combination of medication, behavior therapy, cognitive restructuring, and psychosocial interventions	Y–BOCS interview	30.73 (3.82)	16.43 (6.08)	n.a.	30	30	n.a.	n.a.
Calvocoressi et al. (1993)	USA	101.8 (49.7)	Inpatient treatment; controlled medication trials, standard battery of psychosocial interventions	Y–BOCS interview	27.60 (8.80)	18.30 (9.20)	n.a.	66	66	n.a.	n.a.
Ching et al. (2023)	USA	33.53 (n.a.)	Intensive residential treatment; individual, group, and family therapy, medication management, dietary support, CBT, at least 3 h of ERP per day	Y–BOCS self-report	26.21 (5.54)	21.23 (6.86)	n.a.	43	43	n.a.	n.a.
Cole Monaghan et al. (2015)	USA	50.32 (n.a.)	Intensive residential treatment; individual, group, and milieu therapy, individual CBT for 50 min 2–3 times weekly, weekly case management with a social worker and psychopharmacology consultation, 2 h therapist-guided ERP and 2 h of self-directed ERP per day	Y–BOCS self-report	26.00 (6.80)	16.50 (6.20)	n.a.	324	235	n.a.	n.a.
Diedrich et al. (2016)	Germany	65.41 (24.15)	Intensive inpatient treatment program; group therapy 1-2x per week (occupational therapy, music therapy, sports therapy, and a disorder-specific group), individual therapy, all based on CBT	Y–BOCS interview	24.82 (5.96)	16.99 (7.50)	n.a.	71	69	n.a.	n.a.
Dowling et al. (2016)	Australia	21.00 (n.a.)	Intensive residential treatment; 10 h of CBT each week, 2 h of group-based therapist-directed ERP per day, 2 h self-directed ERP per day, psychoeducation, cognitive therapy, mindfulness, group therapy five days per week	Y–BOCS self-report	28.69 (5.67)	20.29 (6.25)	22.40 (7.04)	49	49	25	1
Drummond et al. (2012)	United Kingdom	–	Intensive inpatient treatment;	Y–BOCS interview	34.80 (3.10)	23.40 (9.20)	n.a.	104	n.a.	n.a.	n.a.

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Table 1 (*continued*)

Study	Country	Mean (*SD*) length of stay in days	Treatment program	Instrument used	Mean (*SD*) at admission	Mean (*SD*) at discharge	Mean (*SD*) at follow-up	Sample size at admission	Sample size at discharge	Sample size at latest follow-up	Time of latest follow-up in months
			psychopharmacological medication, CBT, ERP								
Falkenstein et al. (2020)	USA	50.90 (25.70)	Intensive/residential treatment; CBT, individual and group therapy with 4 h of ERP daily and regular meetings with behavior therapists, family therapists and psychiatrists	Y–BOCS self-report	25.13 (5.90)	15.27 (6.40)	n.a.	446	400	n.a.	n.a.
Fricke et al. (2003)	Germany	71.50 (n.a.)	Inpatient or day-patient treatment program; multiple individual therapy sessions per week, individualized ERP sessions, CBT group therapy	Y–BOCS interview	25.60 (5.40)	15.30 (5.60)	n.a.	55	n.a.	n.a.	n.a.
Fricke et al. (2007)	Germany	59.00 (28.60)	Inpatient treatment program; multiple individual therapy sessions per week, individualized ERP sessions, CBT group therapy	Y–BOCS interview	26.90 (6.40)	18.20 (8.00)	n.a.	41	n.a.	n.a	n.a.
Gönner et al. (2012)	Germany	52.00 (11.90)	Inpatient treatment program; psychoeducation, therapist-led and self-controlled ERP, cognitive restructuring, exercises for mindfulness, perception and body orientation	Y–BOCS self-report	25.60 (5.40)	16.60 (7.90)	n.a.	102	102	n.a.	n.a.
Grøtte et al. (2018)	Norway	21.00 (n.a.)	Inpatient treatment program; psychoeducation, CBT, at minimum 3 ERP exercises per day (one accompanied by personnel, one partially assisted, and one without assistance), relapse prevention interventions	Y–BOCS interview	26.03 (4.80)	12.50 (7.60)	n.a.	187	166	104	6
Herzog et al. (2022)	Germany	54.88 (18.02)	Inpatient treatment; multimodal symptom-specific CBT, acceptance and commitment therapy, ERP, relapse prevention	Y–BOCS self-report	25.50 (5.60)	16.00 (7.20)	n.a.	1595	n.a.	n.a.	n.a.
Hohagen et al. (1998)	Germany	63.00 (n.a.)	Inpatient treatment; multimodal CBT, ERP (therapist-aided, co-therapist-aided, self-management), cognitive restructuring	Y–BOCS interview	28.20 (3.40)	14.15 (7.35)	n.a.	49	49	n.a.	n.a.
Højgaard et al. (2020)	USA	75.43 (34.24)	Intensive residential treatment; CBT, 26.5 h of ERP per week, pharmacotherapy when required	CY–BOCS self-report	25.65 (5.63)	14.13 (8.61)	n.a.	314	314	n.a.	n.a.
Kay et al. (2016)	USA	69.65 (26.78)	Residential treatment; 2–3 h of daily CBT, 5 days per week, ERP during the week and on weekends, two appointments with a psychiatrist per week	CY–BOCS self-report	25.90 (4.40)	10.50 (6.50)	10.20 (7.70)	72	n.a.	20	12
Kordon et al. (2005)	Germany	70.00 (n.a.)	Inpatient treatment; CBT, psychopharmacological medication	Y–BOCS interview	27.60 (5.80)	13.30 (7.40)	15.10 (10.00)	74	74	74	24
Krompinger et al. (2017)	USA	60.00 (n.a.)	Intensive residential treatment program; daily CBT and ERP, several	Y–BOCS self-report	26.90 (5.60)	17.50 (6.70)	n.a.	103	n.a.	n.a.	n.a.

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Table 1 (*continued*)

Study	Country	Mean (*SD*) length of stay in days	Treatment program	Instrument used	Mean (*SD*) at admission	Mean (*SD*) at discharge	Mean (*SD*) at follow-up	Sample size at admission	Sample size at discharge	Sample size at latest follow-up	Time of latest follow-up in months
			individual and family meetings with clinicians per week								
Leonard et al. (2016)	USA	78.00 (39.00)	Residential treatment program; CBT, five appointments per week with behavior therapist for staff assisted ERP, self-directed ERP seven days per week (in total: 26.5 h of ERP per week), cognitive restructuring, activity scheduling for depressive symptoms, interoceptive exposures for panic disorder symptoms, process groups five days per week, non-CBT work (e.g., psychoeducation, discharge planning), experiential therapy groups	CY–BOCS self-report	25.39 (5.36)	13.16 (7.57)	10.30 (7.88)	172	172	44	18
Nanjundaswamy et al. (2020)	India	46.13 (n.a.)	Inpatient treatment; CBT 5–6 times per week (60–90 min per session), pharmacotherapy, ERP, cognitive restructuring	Y–BOCS interview	29.38 (5.72)	16.62 (7.91)	16.75 (8.85)	58	58	58	1–2
Ociskova et al. (2021)	Czech Republic	n.a.	Inpatient treatment program; CBT, daily ERP, transdiagnostic group CBT (20 sessions per program, 90 min per day), daily community session (25 sessions per program, 90 min per session), psychoeducation, case conceptualization, weekly sessions of mental imagery and daily relaxation, sport and ergotherapy, five individual sessions with CBT therapist	Y–BOCS self-report	26.30 (5.54)	21.24 (7.11)	n.a.	94	94	n.a.	n.a.
Ponzini et al. (2019)	USA	50.76 (25.83)	Intensive/residential treatment; ERP (2–4 h daily), two CBT appointments per week, daily group therapy sessions (psychoeducation, CBT-oriented groups, symptom specific groups)	Y–BOCS self-report	25.92 (6.77)	16.31 (6.46)	n.a.	408	306	n.a.	n.a.
Rufer et al. (2006)	Germany	63.00 (n.a.)	Inpatient treatment; multimodal CBT, ERP, cognitive restructuring, group therapies (social skills training, stress-management, problem solving training)	Y–BOCS interview	26.80 (5.10)	17.00 (7.10)	n.a.	104	94	n.a.	n.a.
Saxena et al. (2001)	USA	40.50 (37.00)	Intensive residential treatment; daily CBT in individual and group settings for several hours a day, ERP, medication	Y–BOCS interview	28.00 (4.70)	15.80 (5.90)	n.a.	96	96	n.a.	n.a.
Schubert et al. (2022)	Germany	68.90 (n.a.)	Inpatient treatment; CBT-based specific group therapy (8 sessions of 100 min each within a 4-week period), individual therapy (1–2 times per week), therapist-guided	Y–BOCS self-report	23.87 (6.38)	15.86 (7.98)	n.a.	112	n.a.	n.a.	n.a.

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Table 1 (*continued*)

Study	Country	Mean (*SD*) length of stay in days	Treatment program	Instrument used	Mean (*SD*) at admission	Mean (*SD*) at discharge	Mean (*SD*) at follow-up	Sample size at admission	Sample size at discharge	Sample size at latest follow-up	Time of latest follow-up in months
			ERP, self-controlled ERP, disorder-specific group therapies for treatment of comorbid disorders, group therapy of social skills, mindfulness training, relaxation training, biofeedback, art therapy group and social counselling, medication								
Schultchen et al. (2019)	Germany	63.00 (n.a.)	Inpatient therapy program; CBT, group- and individual therapy elements, 2-week period of ERP, emotion-, mindfulness- and body-related therapy, schema therapy, mindfulness meditation, body psychotherapy, medication	Y–BOCS self-report	21.27 (8.13)	13.08 (6.94)	n.a.	26	n.a.	n.a.	n.a.
Simkin et al. (2022)	United Kingdom	98.00 (n.a.)	Residential treatment; CBT, ERP, activity scheduling, occupational therapy, weekly compassion focused group therapy	Y–BOCS interview	33.51 (3.27)	15.84 (5.84)	n.a.	137	n.a.	n.a.	n.a.
Siwiec et al. (2019)	USA	58.80 (29.70)	Intensive residential treatment; CBT, ERP (4,5 h per weekday, 2,5 h on weekends), medication, support and treatment groups (spirituality, communication skills, experiential therapy, dialectical behavior therapy)	Y–BOCS self-report	25.88 (5.21)	14.23 (4.25)	n.a.	379	379	n.a.	n.a.
Stewart et al. (2005)	USA	66.00 (n.a.)	Intensive residential treatment; CBT (2–4 h daily), weekly psychopharmacology assessments	Y–BOCS interview	26.60 (6.10)	18.60 (7.20)	n.a.	403	230	n.a.	n.a.
Veale et al. 2016a	United Kingdom	72.80 (n.a.)	Residential treatment; up to 4 individual CBT sessions per week, exposure/behavioral experiments, group behavioral experiments, occupational therapy, activity scheduling, weekly Compassionate Mind training and community meeting, at least one home visit or assessment with a resident's family, medication	Y–BOCS interview	30.75 (5.95)	18.55 (7.84)	22.61 (7.88)	383	290	124	6–12
Voderholzer et al. (2013)	Germany	91.00 (n.a.)	Inpatient treatment; CBT, psychoeducation, ERP (therapist-guided 2 h per week, self-guided), two therapeutic sessions per week (each session lasting about 50–60 min), group physiotherapy, ergo therapy (1 h per week)	Y–BOCS interview	25.30 (4.58)	14.10 (5.32)	n.a.	60	60	n.a.	n.a.
Wetterneck et al. (2020)	USA	63.70 (40.06)	Residential treatment program; CBT, ERP, cognitive restructuring; on weekdays: homework review group (30 min), therapist-aided and self-	Y–BOCS self-report	28.44 (5.26)	16.68 (6.38)	n.a.	150	150	n.a.	n.a.

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Table 1 (*continued*)

Study	Country	Mean (*SD*) length of stay in days	Treatment program	Instrument used	Mean (*SD*) at admission	Mean (*SD*) at discharge	Mean (*SD*) at follow-up	Sample size at admission	Sample size at discharge	Sample size at latest follow-up	Time of latest follow-up in months
			directed ERP (2.5 h), therapist-aided cognitive restructuring (1 h), recreational therapy (1 h), self-directed ERP and cognitive restructuring (90 min); on weekends: homework review group (30 min), self-directed ERP (2 h), therapist-aided group cognitive restructuring (1 h); pharmacotherapy								
Wheaton et al. (2020)	USA	49.57 (22.07)	Intensive residential treatment; ERP (2–4 h daily), weekly meetings with psychiatrists, case management	Y–BOCS self-report	26.02 (5.58)	14.84 (6.64)	n.a.	154	154	n.a.	n.a.
Wheaton et al. (2023)	USA	56.48 (44.33)	Intensive residential treatment; 6.5 h of treatment per day on weekdays (individual, group, milieu, and family therapy), therapy sessions on weekends, CBT, ERP	Y–BOCS self-report	27.67 (5.35)	16.69 (6.11)	n.a.	124	124	n.a.	n.a.

Notes. USA = United States of America, Y–BOCS = Yale–Brown Obsessive Compulsive Scale, CY–BOCS = Children's Yale–Brown Obsessive Compulsive Scale, OCI–R = Obsessive Compulsive Inventory–Revised, DOCS = Dimensional Obsessive–Compulsive Scale, CBT = Cognitive Behavioral Therapy, ERP = Exposure and response prevention.

3.3. Risk of bias

The majority of studies had low risk of bias and a small subset of studies had high risk of bias in four of the seven categories (Fig. 2). Although the funnel plot shows some symmetry around the mean, the scatter plot is not strictly a funnel shape (Fig. 3). Yet, this is likely based more on high between-study heterogeneity and less on publication bias (Sterne et al., 2011). The rank correlation test for funnel plot asymmetry was not significant ($\tau = -0.18$, $p = 0.100$), indicating that there was no publication bias. The WAAP-WLS procedure revealed that all 43 studies were adequately powered (power >80%) and the weighted least squares estimated effect size was −1.47 (95%CI [−1.58; −1.36], $p < 0.001$).

3.4. Effects from admission to discharge

The pooled effect size across all studies indicated significant and large reductions in obsessive–compulsive symptoms from admission to discharge ($g = -1.59$, 95%CI [−1.76; −1.41], $p < 0.001$; 95% prediction interval [−2.67; −0.51]) with substantial heterogeneity across studies ($Q(42) = 543.23$, $p < 0.001$; $I^2 = 92.3\%$, 95%CI [90.5%; 93.7%]; Fig. 4).

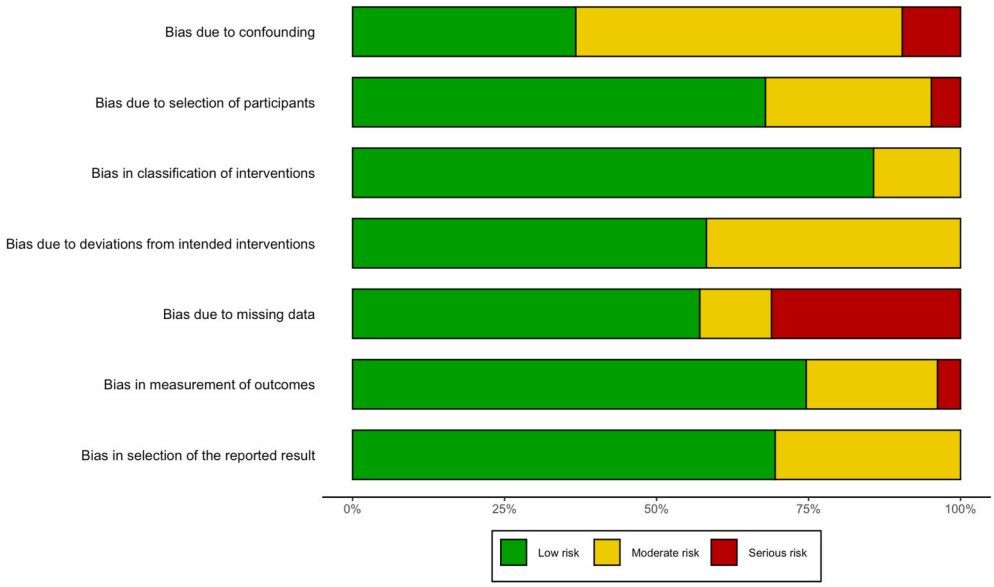

Fig. 2. Risk of bias assessment using the "Risk Of Bias In Non-randomised Studies – of Interventions" (ROBINS–I) tool.

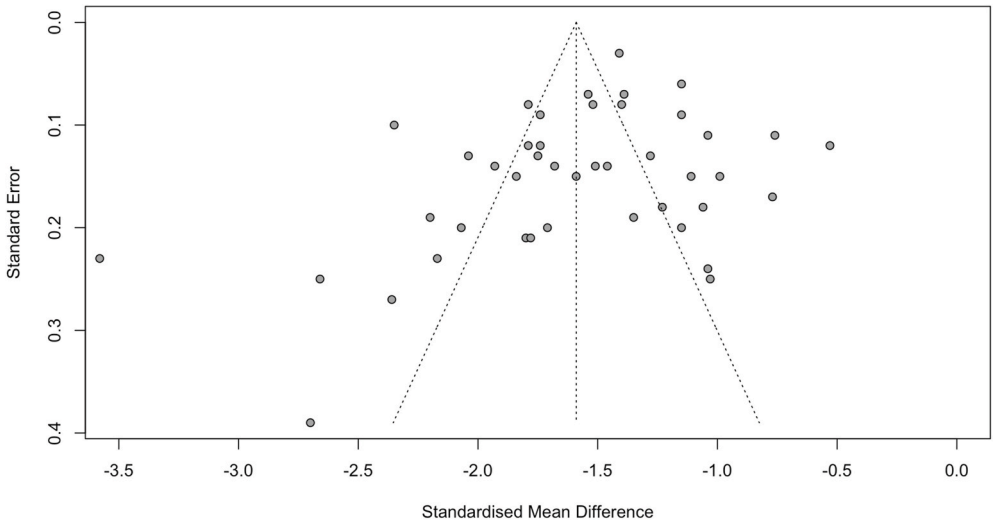

Fig. 3. Funnel plot assessing publication bias of studies included in the meta-analysis.

3.5. Effects from discharge to follow-up

The pooled effect size across the ten studies that reported follow-up measurements indicated no significant changes in obsessive–compulsive symptoms from discharge to follow-up ($g = 0.06$, 95%CI [−0.09; 0.21], $p = 0.389$; 95% prediction interval [−0.42; 0.54]) with substantial heterogeneity across studies ($Q(9) = 77.58$, $p < 0.001$; $I^2 = 88.4\%$, 95% CI [80.7%; 93.0%]; Fig. 5).

3.6. Moderator analyses

Meta-regressions showed that the predictors length of stay, age, sex, and region did not explain heterogeneity across the studies for the treatment effect from admission to discharge (all $ps > 0.142$). Instrument used (i.e., self-report versions versus interview version) partly explained heterogeneity in the treatment effect from admission to discharge across the studies ($b = -0.35$, $SE = 0.17$, $p = 0.043$), indicating that effect sizes were larger in studies using the Y–BOCS interview version than in studies using self-report questionnaires (Fig. 6).

4. Discussion

4.1. Summary of results

The current study meta-analytically examined effects of inpatient, residential, and day-patient treatment in persons with OCD from admission to discharge as well as from discharge to follow-up. In all studies, multimodal treatment programs that included CBT with exposure and response prevention were administered. Symptom severity was comparable to other studies with inpatients with OCD and, thus, higher than in outpatients with OCD (Grøtte et al., 2018). Results showed symptom reductions from admission to discharge with a large effect size ($g = -1.59$) for inpatient, residential, and day-patient treatment (Fig. 4). Risk of bias was low across studies and there was no indication of publication bias (e.g., weighted least squares based effect size [−1.47] was practically equivalent to the coefficient of the random effects model; Stanley and Doucouliagos, 2017). When examining changes from discharge to follow-up, there was no statistically significant effect, that is, OCD symptoms did not change on average. Heterogeneity in the estimate of the treatment effect was substantial in both meta-analyses. Length of stay, age, sex, and region did not explain heterogeneity in the treatment effect from admission to discharge across the studies. Yet, instrument used, that is, self-report versus interview versions, did partly explain heterogeneity in the treatment effect from admission to discharge across the studies such that effect sizes were larger in studies that used the interview version of the Y–BOCS. Moderator analyses for changes from discharge to follow-up were not conducted due to only a small number of studies with follow-up data being available.

4.2. Changes in obsessive–compulsive symptoms

The main result, specifically the large effect size for treatment from admission to discharge, is in line with the results of a previous meta-analysis on administering inpatient, residential, or day-patient treatment to persons with severe or treatment-refractory OCD by Veale et al. 2016a. Hence, in accordance with treatment guidelines for OCD, such as the German treatment guideline (DGPPN, 2022), these treatment variants are encouraging options for persons with OCD as significant improvements can be achieved which might not necessarily be possible in an outpatient setting. As there was no statistically significant effect for the period between discharge and follow-up measurement, this shows that symptom reductions were maintained by persons with OCD up to two years. This is of particular importance because persons with OCD are especially vulnerable for potential relapses after discharge from a hospital as they return to their private environment where they are usually confronted with stimuli provoking obsessions and compulsions (Rowa et al., 2007). Thus, the current results show that persons with OCD do not only achieve considerable symptom reductions from admission to discharge in inpatient, residential, or day-patient treatment but are also capable of maintaining their success.

Substantial heterogeneity in the estimate of the treatment effect size might be explained by several factors. First, although most variables included in moderator analyses (i.e., length of stay, age, sex, region of the study) did not explain heterogeneity in the treatment effect from admission to discharge, we could only find and include few studies from countries other than USA, Germany, or United Kingdom. Second, it is possible that treatments administered in individual studies differed in variables other than those tested in moderator analyses. Despite considerable similarities in the treatment programs, specifically the administration of CBT and ERP only, there might have also been several differences. For example, Boger et al. (2020) reported that in their study, patients received one session of individual psychotherapy per week while Fricke et al. (2003) reported that in their study, patients received multiple sessions of individual psychotherapy per week.

4.3. Moderator analyses

Age, length of stay, sex, and region did not explain heterogeneity

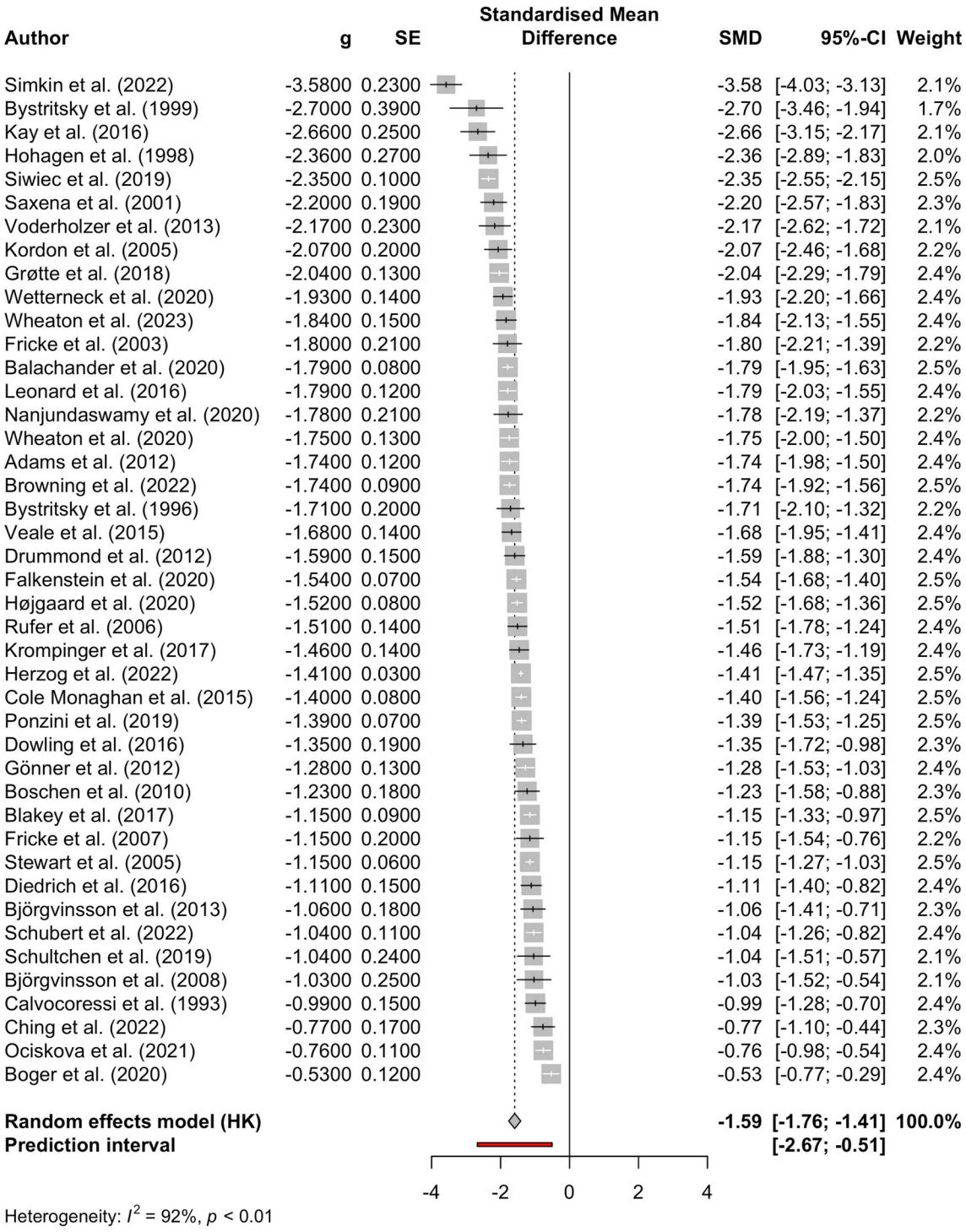

Fig. 4. Forest plot displaying the standardized mean difference for each study included in the meta-analysis for changes from admission to discharge as well as their weighted contributions to the overall estimate of change. The pooled effect size (i.e., overall estimate of change), the prediction interval, and the heterogeneity index is also displayed.

across the studies included, suggesting that inpatient, residential and day-patient treatment for OCD is equally effective across age groups and treatment durations, for both males and females, and in Europe and the USA. These results are in line with some results of a previous meta-analysis by Veale et al. 2016b. Their results also showed that length of stay did not explain heterogeneity in the effect size. In addition, a meta-analysis examining predictors and moderators of responses to psychological therapies in outpatients with OCD found that gender did not significantly explain heterogeneity for the outcome (Knopp et al., 2013). Nevertheless, it should be noted that most studies in the field of psychology are conducted by using so-called WEIRD (Western, educated, industrialized, rich, democratic) samples (Henrich, 2015; Muthukrishna et al., 2020). Thus, there are several sociodemographic factors (e.g., diverse ethnic groups, sexual orientation) that have largely been neglected in past and need to be addressed in future studies to examine whether treatment effects can be generalized to those persons as well.

The only moderator effect was found for instrument used (indicating

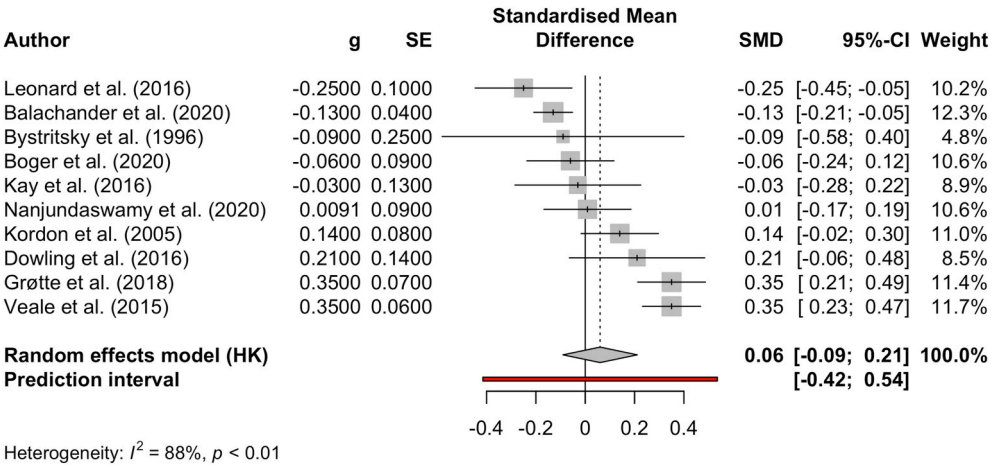

Fig. 5. Forest plot displaying the standardized mean difference for each study included in the meta-analysis for changes from discharge to follow-up as well as their weighted contributions to the overall estimate of change. The pooled effect size (i.e., overall estimate of change), the prediction interval, and the heterogeneity index is also displayed.

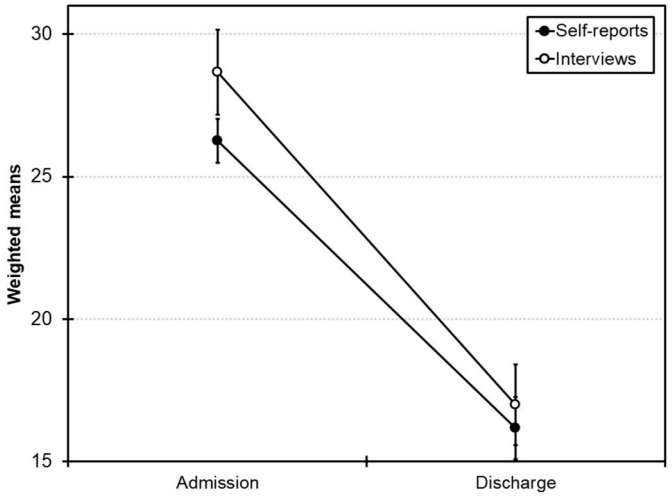

Fig. 6. Weighted means at admission and discharge as a function of instrument used (interview versus self-report). Means were calculated with the metamean function of the *R* package meta, which uses the inverse variance method for pooling. Error bars indicate 95% confidence intervals.

that treatment effects were larger when the interview version of the Y–BOCS was used than when self-report measures were used). Although we cannot fully explain this effect based on the current data and analyses, it might be due to two reasons. First, the Y–BOCS interview version may have higher validity than the self-report version (Federici et al., 2010; Goodman et al., 1989a; Goodman et al., 1989b; Rosenfeld et al., 1992; Steketee et al., 1996). For example, as many patients are unfamiliar with the concepts of obsessions and compulsions at admission, the values collected by the use of the Y–BOCS self-report version at admission might be systematically underestimated (Hauschildt et al., 2019). Second, it might also be that reductions in obsessive–compulsive symptoms may be overestimated if the interview is conducted by the patients' therapists who are not blinded to the treatment.

4.4. Clinical implications

The current study documents large symptom reductions in persons with OCD when they are treated with multimodal (partial) hospitalized programs and these treatment effects seem to remain stable after discharge. Such treatment options are currently recommended in treatment guidelines when prior treatments have been unsuccessful or when suitable guideline-based outpatient treatment is not available (DGPPN, 2022). Thus, a future avenue would be to test whether the benefits of such treatments (i.e., large symptom reductions) outweigh their costs (e.g., financial costs). If so, (partial) hospitalized treatments for OCD may be recommended earlier in future revisions of treatment guidelines. Yet, it should be noted that the current study only tested treatment effects without comparisons to alternative treatments. For example, a crucial issue when comparing "real world" effects of outpatient versus day-patient/inpatient treatment is that patients differ in certain characteristics (e.g., symptom severity, number of prior unsuccessful treatments). Thus, it is important that future studies that contrast these different treatment options do this in randomized controlled trials in order to remove such baseline differences and to carry out cost-benefit-analyses.

4.5. Limitations

Naturally, interpretation of the current findings is limited to data of original research studies which are already published. Yet, there may be a reporting bias as many hospitals which offer inpatient, residential, or day-patient treatment for persons with OCD are not interested in publishing the data of their patients in the form of studies. Accordingly, it can be assumed that there may be much more data on the research question of the current systematic review and meta-analysis which we could not include as it is not published. Another limitation is that in earlier studies, persons with hoarding disorder were included as this diagnosis belonged to the OCD category in the DSM-IV (Mataix-Cols and Pertusa, 2012). Thus, it is possible that the effect shown in this meta-analysis might be even higher if patients with hoarding disorder were excluded. Moreover, in the analyses, we were not able to control for psychopharmacological medication as this was only reported unsystematically in the included studies and there was only one study which did not use any psychopharmacological medication (Voderholzer et al., 2013). Although we could not include psychopharmacological medication in moderator analyses, it can be noted that the effect size reported in Voderholzer et al. (2013) was in the upper third of the largest effect sizes (Fig. 4). As a future direction, we would therefore suggest to report prescribed medication more transparently in future studies so that calculation of moderator analyses is possible in future meta-analyses.

Furthermore, we could not calculate moderator analyses for the effect from discharge to follow-up as the number of studies that reported follow-up data was too little for those analyses. Hence, future original

research studies assessing the effect of inpatient, residential, or day-patient treatment in persons with OCD might also collect follow-up data after discharge as this time period is especially important in regard of potential relapses and it is of particular interest if reductions in symptom severity can be maintained. Furthermore, interpretation of the current results is limited to studies and treatments in the USA and Europe and may not translate to other parts of the world or persons from other than WEIRD nations. Specifically, only three studies were included from Australia and Asia (India) and no studies from South America or Africa. Thus, there is an urgent need to conduct studies on treatment effects for OCD in these regions, which can then be included in future meta-analyses.

5. Conclusions

This systematic review and meta-analysis showed that inpatient, residential, and day-patient treatment is a promising treatment option for persons with OCD. By undergoing this treatment, persons with OCD can achieve large reductions in OCD symptom severity which can be maintained for a longer period of time after discharge from the hospital. While larger treatment effects can be observed when obsessive–compulsive symptoms are assessed with the interview version of the Y–BOCS than when self-report questionnaires are used, the current meta-analysis also shows that certain sociodemographic variables and treatment duration do not explain heterogeneity in the treatment effect across studies and, thus, that inpatient, residential, and day-patient treatment for OCD seems to be effective independent of patients' age, sex, location, and length of stay. Besides OCD symptom reductions, future meta-analyses might also assess effects of inpatient, residential, or day-patient treatment on quality of life, comorbidity rates, and social participation.

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CRediT authorship contribution statement

Eva M. Zisler: Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Data curation, Conceptualization. **Adrian Meule:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Dominique Endres:** Writing – review & editing. **Rebecca Schennach:** Writing – review & editing. **Lena Jelinek:** Writing – review & editing. **Ulrich Voderholzer:** Writing – review & editing, Supervision, Conceptualization.

Declaration of competing interest

The authors report that there are no competing interests to declare.

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6. Artikel II

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Duration of daily life activities in persons with and without obsessive–compulsive disorder

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ABSTRACT

Persons with obsessive–compulsive disorder (OCD) are often impaired in their daily level of functioning due to their time-consuming obsessions and/or compulsions. To date, however, studies are lacking that quantify how much time persons with OCD actually spend on activities of daily living. Therefore, the current study assessed 13 daily life activities (in minutes) with a self-report questionnaire in 299 persons with OCD at admission to inpatient treatment and 300 age- and sex-matched persons without OCD. A majority of persons with OCD indicated that they experienced obsessions and/or compulsions when leaving (84%) and cleaning (70%) the apartment, grocery shopping (66%), changing clothes (66%), and showering with (62%) and without (63%) shampooing. Persons with OCD who experienced obsessions and/or compulsions during a given daily life activity—but not those who did not experience obsessions and/or compulsions during these activities—reported longer durations for performing 10 of the 13 activities than persons without OCD. For most activities, longer durations related weakly but significantly to higher OCD symptom severity. Results indicate that the duration of daily life activities seems to depend more on whether persons with OCD experience obsessions and/or compulsions during a specific activity and less on whether a person is diagnosed with OCD in general. Future studies may use other assessment methods that allow for tracking the duration in daily life in real time.

1. Introduction

Obsessive–compulsive disorder (OCD) is a relatively common mental disorder which affects approximately 2% of the general population (Murphy et al., 2010; Voderholzer et al., 2022). The condition is characterized by the occurrence of obsessions, compulsions, or both (American Psychiatric Association, 2013; World Health Organization, 1993). Obsessions are repetitive and persistent thoughts, images, or impulses that are intrusive and mostly perceived as unpleasant and disturbing. Compulsions are recurrent acts which are often performed to neutralize obsessions and, therefore, perceived as relieving (Abramowitz et al., 2009). As OCD is a symptomatically heterogenous condition, these obsessions and/or compulsions can occur in various forms such as repeating words silently, ordering, or fear of behaving unacceptably (Heyman et al., 2006; World Health Organization, 1993). Onset of OCD is often gradual and—if adequate treatment is lacking—the course of the disorder is often chronic (Abramowitz and Reuman, 2009; Skoog and Skoog, 1999).

An essential feature of OCD is that the obsessions and/or compulsions are time-consuming (American Psychiatric Association, 2013; Hoffmann and Hofmann, 2017, p. 42). As OCD is a heterogenous condition, individual differences in the frequency and severity of symptoms do exist, and as such, time occupied by obsessions and/or compulsions varies across persons. Existing literature suggests that time occupied by symptoms is associated with lower quality of life and greater impairment in daily functioning in persons with OCD (Eisen et al., 2006; Macy et al., 2013; Meule and Voderholzer, 2020).

Although extensive literature suggests that OCD is associated with significant impairment in day-to-day functioning (Eisen et al., 2006; Sahoo et al., 2017; Stengler-Wenzke et al., 2006), limited research has explicitly examined how daily tasks unassociated with OCD symptomatology are impacted by the condition. In severe OCD presentations,

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symptoms may become so time consuming that individuals neglect to or are unable to engage in self-preservation activities, including eating and drinking (Brierley et al., 2021). Because of repetition and exactness often seen in the context of OCD, it is plausible to suggest that daily tasks, such as brushing teeth, washing hands, and/or cleaning the apartment, require more time for individuals with OCD relative to those without (Subramaniam et al., 2013). Additionally, there may be differences in the duration required for daily activities as a function of OCD symptom subgroups (i.e., contamination compared to taboo thought OCD presentations) and/or levels of OCD symptom severity.

Addressing this gap in literature may have implications for clinical practice. For example, quantifying the duration of daily life activities in persons with and without OCD may be of substantial benefit in helping persons with OCD achieve higher symptom insight as they often underestimate the duration of their daily life activities (Koch et al., 2023, p. 88; Voderholzer et al., 2022). Behavioral observation (i.e., measurement of the time required to perform a certain activity) and comparing results of this behavioral observation with reference values of persons without OCD can be used to demonstrate persons with OCD that the time they spend on daily life activities is excessive. This insight can then be used therapeutically by discussing with the patient how this time could alternatively be spent on other, more enjoyable activities. Enhancing symptom insight in persons with OCD is a crucial aspect contributing to favorable treatment outcomes as persons with OCD with low symptom insight are less likely to respond to first-line treatments such as cognitive-behavioral therapy with exposure and response prevention (Middleton and Hezel, 2019). In addition, investigating the time spent on certain daily life activities would provide reference values which persons with OCD and psychotherapists can use for therapy to delineate normal and clinically relevant durations of daily life activities. Thus, persons with OCD may use these reference values as a guide to relearn how much time should be spent on daily life activities on average (Koch et al., 2023, p. 88). Finally, quantification of the duration of daily life activities in persons with OCD may help clinicians by identifying areas more or less impacted by OCD symptomatology and tailor exposure exercises accordingly to help reduce time spent on those activities.

Hence, the current study aimed to quantify the duration of daily life activities in persons with OCD and examine for which activities persons with OCD take longer than persons without OCD. For this purpose, adult persons with OCD receiving inpatient treatment and age- and sex-matched persons without OCD completed a self-report questionnaire that asked about the duration of 13 daily life activities. It was expected that persons with OCD would report longer durations of performing daily life activities compared to persons without OCD. In a second step, we examined whether general group differences would primarily be due to the subgroup of persons with OCD who reported to experience obsessions and/or compulsions during certain daily life activities. In persons with OCD, it was expected that those who reported to experience obsessions and/or compulsions for a given activity would take longer for performing those daily life activities compared to persons with OCD who reported to not experience obsessions and/or compulsions for the respective activities and persons without OCD. Finally, it was explored whether the duration of daily life activities was associated with general obsessive–compulsive symptom severity.

2. Method

2.1. Sample characteristics

In the current study, data of 299 adult persons with OCD who received inpatient treatment at the Schoen Clinic Roseneck (Prien am Chiemsee, Germany) between 2020 and 2022 and a control group of 300 adults without OCD who were recruited in October 2022 were analyzed. There were no other inclusion or exclusion criteria. The persons with OCD were admitted to the hospital in accordance with the recommendations of German guidelines for the treatment of OCD such as the lack of outpatient treatment options or high symptom severity which hindered outpatient treatment (Voderholzer et al., 2022). In this group, age ranged between 18 and 70 years and about 60% were female (Table 1). Two-hundred and twenty-one persons with OCD (73.9%) had at least one comorbid mental disorder. The most common comorbid mental disorders were affective disorders (n = 197, 65.9%, ICD–10 code F3), anxiety disorders (n = 65, 21.7%, ICD–10 code F4), and eating disorders (n = 18, 6.0%, ICD–10 code F5). On average, persons with OCD had moderate OCD symptom severity according to the self-report version of the Y–BOCS (mean sum score of 25.14, SD = 6.68, Table 1; see recommendations by Cervin et al., 2022).

Similar to the persons with OCD, the age of persons without OCD ranged between 18 and 70 years and about 60% were female (Table 1). None of the persons in this group reported to have ever been diagnosed with any mental disorder or OCD in particular. Similarly, average self-report Y–BOCS scores were low (mean sum score of 6.40, SD = 4.50, Table 1; see recommendations by Cervin et al., 2022).

2.2. Materials, data handling, and ethical approval

The persons with OCD completed a self-made questionnaire assessing the duration of daily life activities as part of the routine diagnostic assessment at admission. At the Schoen Clinic Roseneck, data (e.g., demographics, clinical assessments as well as diagnoses, and self-report questionnaires) are de-identified and automatically transferred to a database for analysis, preserving anonymity. Persons without OCD were recruited via Bilendi which is a service provider for market research (https://www.bilendi.de) in a completely anonymized online panel survey. According to the guidelines by the ethics committee of the LMU Munich (Munich, Germany), both retrospective studies conducted on already available, anonymized data (i.e., data of persons with OCD used in the current study) and completely anonymized, prospective questionnaire studies (i.e., data of persons without OCD in the current study) are exempt from requiring ethics approval.

2.3. Measures

Demographic and clinical data. Information about age (in years),

Table 1
Descriptive and test statistics for sociodemographic and psychopathological variables in persons with and without obsessive–compulsive disorder (OCD).

Dependent variable	Persons with OCD	Persons without OCD	Test statistic	p	Effect size
Age (years)	M = 33.87 (SD = 12.45)	M = 35.29 (SD = 11.98)	U = 40957.00	.066	r_{rb} = −0.09
Sex (female)	n = 179 (59.9%)	n = 179 (59.7%)	–	.513	φ = .002
Obsessive–Compulsive Inventory–Revised	M = 32.91 (SD = 12.61)	M = 15.37 (SD = 12.43)	U = 74913.00	<.001	r_{rb} = 0.68
Yale–Brown Obsessive Compulsive Scale	M = 25.14 (SD = 6.68)	M = 6.40 (SD = 4.50)	U = 87058.50	<.001	r_{rb} = 0.97
Patient Health Questionnaire–9	M = 12.80 (SD = 5.93)	M = 4.50 (SD = 4.43)	U = 73430.00	<.001	r_{rb} = 0.73
Generalized Anxiety Disorder Scale–7	M = 12.34 (SD = 4.82)	M = 3.10 (SD = 3.45)	U = 78775.50	<.001	r_{rb} = 0.86

Notes. Effect size = matched-pairs rank biserial correlation coefficients for Mann–Whitney U test; phi coefficient for Fisher's exact test.

biological sex (male/female), and diagnoses of mental disorders were obtained from the clinical records. That is, diagnoses were established by an unstructured clinical interview by psychotherapists (i.e., specialized psychologists or physicians with psychotherapeutic training).

Questionnaire on the duration of daily life activities. A survey in the form of a self-report questionnaire was developed by the research team to assess the duration of daily life activities across 13 domains. These domains were identified following discussions regarding different daily life activities and possible response scales by the research team and input of subject matter experts. Care was taken to only select activities that all persons engage in on a daily or nearly daily basis. The preliminary set of questions involved 14 items but one item (shaving the face) was removed as it was disproportionally relevant to some, but not all persons. The following 13 daily life activities were chosen: leaving the apartment, handwashing, brushing teeth, urinating, changing clothes, performing a bank transfer, defecating, showering with and without shampooing, writing an email, eating a meal, grocery shopping, and cleaning the apartment. For each activity, persons with OCD were asked to indicate whether they experienced obsessions and/or compulsions when performing the activity by selecting yes or no. These questions were not used in the questionnaire for the persons without OCD as only persons were recruited without an OCD and, thus, it was expected that most persons would be unfamiliar with the concepts of obsessions and/or compulsions. Both persons with and without OCD were instructed to report the total amount of time spent performing the different tasks assessed. They were asked to round to the nearest whole integer (i.e., rounding down to 0 for a duration of <30 s, rounding up to 1 min for a duration of ≥ 30 s). This instruction was chosen because it was deemed unrealistic that persons can report on the duration of such activities to a precision exact to the second. Another reason was that it was aimed to avoid any reporting errors as a result of persons with and without OCD having to convert seconds to decimal numbers in minutes or vice versa.

Obsessive–Compulsive Inventory–Revised (OCI–R). The German version (Gönner et al., 2007) of the OCI–R (Foa et al., 2002) was used to assess obsessive–compulsive symptoms at admission. The OCI–R is an 18-item self-report questionnaire comprising six subscales: washing, checking, ordering, obsessing, hoarding, and neutralizing. Responses are recorded on a five-point scale which ranges from 0 = *not at all* to 4 = *extremely* and relates to the extent of distress experienced in the course of the past month due to OCD symptoms. Only the total score was used in the current analyses. Internal reliability coefficients were $\alpha = .85$ in the validation study of the German version (Gönner et al., 2007) and $\omega = .91$ in the current study. Convergent validity has been supported by medium-to-high correlations with other measures for obsessive–compulsive symptomatology and divergent validity has been supported by small correlations with measures for related but distinct constructs such as depression and anxiety (Gönner et al., 2007).

Yale–Brown Obsessive Compulsive Scale (Y–BOCS). The German self-report version (Schaible et al., 2001) of the Y–BOCS (Baer, 1991; Baer et al., 1993) was used to assess OCD severity at admission. The Y–BOCS is a 10-item self-report questionnaire with two subscales: obsessions and compulsions. Responses are recorded on a five-point scale ranging from 0 = *no symptoms* to 4 = *extreme symptoms*. Only the total score was used in the current analyses. Internal reliability coefficients ranged between $\alpha = .78$–$.88$ in two validation studies (Federici et al., 2010; Rosenfeld et al., 1992; Steketee et al., 1996) and was $\omega = .93$ in the current study. Convergent validity has been supported by high correlations with other measures for obsessive–compulsive symptomatology and divergent validity has been supported by moderate correlations with measures for related but distinct constructs such as worry (Ólafsson et al., 2010; Rapp et al., 2016; Steketee et al., 1996).

Patient Health Questionnaire–9 (PHQ–9). The German version (Löwe et al., 2002) of the PHQ–9 (Spitzer et al., 1999) was used to assess depressive symptoms for testing whether the general psychopathology scores of persons without OCD were comparable to other non-clinical samples. The PHQ–9 is a self-report questionnaire with 9 items and responses are recorded on a four-point scale ranging from 0 = *not at all* to 3 = *nearly every day*. Internal reliability coefficients were $\alpha = .89$ in a previous study (Kroenke et al., 2001) and $\omega = .92$ in the current study. Construct validity has been supported, for example, by negative associations with health-related quality of life (Kroenke et al., 2001).

Generalized Anxiety Questionnaire–7 (GAD–7). The German version (Löwe et al., 2008) of the GAD–7 (Spitzer et al., 2006) was used to assess anxiety symptoms for testing whether the general psychopathology scores of persons without OCD were comparable to other non-clinical samples. The GAD–7 is a self-report questionnaire comprising 7 items and responses are recorded on a four-point scale ranging from 0 = *not at all* to 3 = *nearly every day*. Internal reliability coefficients were $\alpha = .92$ in a previous study (Spitzer et al., 2006) and $\omega = .93$ in the current study. Convergent validity has been supported by high correlations with other measures for anxiety (Spitzer et al., 2006).

2.4. Data analyses

Data were analyzed with *R* version 4.2.1 (RCore Team, 2022), *RStudio* version 2022.07.1 (RStudio Team, 2022), *JASP* version 0.16.4.0 (JASP Team, 2022) and *SPSS* version 27.0 (SPSS, 2020). Non-parametric and robust techniques were used for all analyses as distributions of duration of daily life activities were right-skewed and contained outliers. To test whether groups were similar in age and sex but different in OCD-specific (OCI–R, Y–BOCS) and general (PHQ–9, GAD–7) psychopathological variables, persons with and without OCD were compared with Mann–Whitney U and Fisher's exact test. To test whether groups differed in the duration of daily life activities, persons with and without OCD were compared with Mood's median test using the *RVAideMemoire* package version 0.9-81-2 (Hervé and Hervé, 2020). In addition, persons with OCD were further divided into those with vs. without obsessions and/or compulsions when performing a given activity. To test whether these three groups (i.e., persons with OCD with obsessions and/or compulsions, persons with OCD without obsessions and/or compulsions, persons without OCD) differed in the duration of daily life activities, they were compared with Mood's median test, followed by pairwise comparisons (again using Mood's median test), if appropriate.

Associations between the duration of daily life activities and OCD symptom severity (OCI–R, Y–BOCS) were examined with robust percentage bend correlation coefficients with the *WRS2* package version 1.1–4 (Mair and Wilcox, 2020; Wilcox, 1994). In addition, it was tested whether the size and/or direction of these associations would be different in persons with OCD with obsessions and/or compulsions, persons with OCD without obsessions and/or compulsions, and persons without OCD. For this, robust linear regressions were run (separately for each activity and each OCD symptom severity measure) with the *robustbase* package version 0.95-0 (Maechler et al., 2022). Note that, as there were three groups, these needed to be dummy coded into two variables, each representing the contrast of one group compared to a reference group. When examing moderation effects involving such a multicategorical variable, this means that there are also two interaction terms for each dummy coded variable (Hayes and Montoya, 2017). Because of this, models without interaction terms were run that included scores of one symptom severity measure (OCI–R or Y–BOCS) and the two dummy coded variables as independent variables and duration of daily life activities as dependent variable. In a second step, an interaction *symptom severity measure* × *group* was added and models were compared using *R*'s *anova* function, which, in this case, calculates a Wald-test to compare the two models. If the two models were significantly different (indicating that the association between duration of daily life activities and OCD symptom severity was different in the three groups), robust percentage bend correlation coefficients were calculated separately for each group.

As has been suggested by others, effects were considered significant at $p < .005$ because of the numerous inferential tests (Benjamin et al.,

2018). The *R* code and data which can be used to reproduce all Mood's median tests, robust percentage bend correlation coefficients, and robust regression analyses are available at https://osf.io/v37j8/.

3. Results

Persons with and without OCD did not differ in age and sex. Yet, persons with OCD had higher OCI–R, Y–BOCS, PHQ–9, and GAD–7 scores than persons without OCD (Table 1). Persons with OCD reported significantly longer durations for brushing teeth, performing a bank transfer, showering with and without shampooing, and writing an email than persons without OCD (Table 2). A majority of persons with OCD indicated that they experienced obsessions and/or compulsions when leaving (84%) and cleaning (70%) the apartment, grocery shopping (66%), changing clothes (66%), and showering with (62%) and without (63%) shampooing (Table 3). Persons with OCD experiencing obsessions and/or compulsions when performing a given activity reported longer durations than persons without OCD for all activities except leaving the apartment, grocery shopping, and cleaning the apartment (Table 3). They also reported longer durations than persons with OCD not experiencing obsessions and/or compulsions for all activities except cleaning the apartment (Table 3).

In the total sample, a longer duration was associated with higher OCD symptom severity with small effect sizes for the majority of daily life activities (Table 4). For leaving the apartment, the interaction between Y–BOCS and group ($\chi^2 = 11.63$, $p = .003$) was significant: the association between duration of leaving the apartment and OCD symptom severity was larger in persons with OCD experiencing obsessions and/or compulsions than in persons with OCD without obsessions and/or compulsions or persons without OCD (Table 4). For writing an email, the interactions between OCI–R and group ($\chi^2 = 12.41$, $p = .002$) as well as between Y–BOCS and group ($\chi^2 = 11.30$, $p = .004$) were significant: the association between duration of writing an email and OCD symptom severity was larger in persons with OCD experiencing obsessions and/or compulsions than in persons with OCD without obsessions and/or compulsions or persons without OCD (Table 4).

Table 2
Descriptive and test statistics for the duration of daily life activities in persons with and without obsessive–compulsive disorder (OCD).

Activity (minutes)	Persons with OCD		Persons without OCD		Test statistics		
	Mdn	*M*	*Mdn*	*M*	χ^2	*p*	*Effect size*
Leaving apartment	5	12.46	5	10.32	2.90	.088	$r_{rb} = 0.03$ ($d = 0.09$)
Handwashing	1	4.02	1	5.22	5.69	.017	$r_{rb} = 0.05$ ($d = -0.03$)
Brushing teeth	3	4.37	3	3.68	10.09	.001	$r_{rb} = 0.09$ ($d = 0.12$)
Urinating	2	4.19	2	2.98	3.42	.064	$r_{rb} = 0.04$ ($d = 0.22$)
Changing clothes	5	6.48	4	5.90	1.40	.236	$r_{rb} = 0.02$ ($d = 0.04$)
Bank transfer	4	6.42	3	4.76	20.65	<.001	$r_{rb} = 0.18$ ($d = 0.12$)
Defecating	7	13.12	5	8.65	3.23	.072	$r_{rb} = 0.13$ ($d = 0.24$)
Showering without shampooing	10	17.94	7	9.60	45.32	<.001	$r_{rb} = 0.32$ ($d = 0.39$)
Showering with shampooing	15	23.77	10	13.53	29.53	<.001	$r_{rb} = 0.32$ ($d = 0.44$)
Writing email	5	7.22	3	4.74	17.05	<.001	$r_{rb} = 0.22$ ($d = 0.32$)
Eating meal	15	17.05	15	19.62	2.94	.087	$r_{rb} = 0.01$ ($d = -0.08$)
Grocery shopping	30	32.30	30	36.72	0.35	.556	$r_{rb} = -0.09$ ($d = -0.10$)
Cleaning apartment	85	131.34	60	87.13	1.50	.220	$r_{rb} = 0.07$ ($d = 0.38$)

Notes. Note that groups were compared using the median of the duration of daily life activities. Arithmetic means are reported here for transparency but readers should be aware that—in contrast to the median—these values are substantially biased by outliers. Effect size = Matched-pairs rank biserial correlation coefficient (Cohen's *d* in parentheses).

4. Discussion

4.1. Summary and interpretation of results

This is the first study assessing the duration of daily life activities in persons with OCD receiving inpatient treatment compared to persons without OCD. The present findings suggest that persons with OCD require more time for brushing teeth, effecting a bank transfer, showering with and without shampooing, and writing an email than persons without OCD. The duration for other daily life activities (leaving the apartment, handwashing, urinating, changing clothes, defecating, eating a meal, grocery shopping, and cleaning the apartment) did not significantly differ between groups. Longer durations for daily life activities in persons with OCD may be due to activities often being accompanied by constant doubts as to whether they have been carried out sufficiently (Samuels et al., 2017). Additionally, another reason for longer durations in daily life activities in persons with OCD may be not-just-right feelings resulting in persons with OCD either repeating the same brief action many times in a row or performing a comprehensive sequence of actions very slowly (Coles et al., 2005; Coles and Ravid, 2016).

Yet, it appears that it is crucial to also differentiate whether persons with OCD experience obsessive thoughts or the urge to perform compulsions during a given activity. For example, a majority of persons with OCD indicated that they experienced obsessions and/or compulsions when leaving the apartment, changing clothes, showering with and without shampooing, grocery shopping and cleaning the apartment. In contrast, only approximately one third of persons with OCD reported to experience obsessions and/or compulsions when eating a meal or when brushing teeth. When differentiating between three groups (i.e., persons without OCD, persons who indicated to not experience obsessions and/or compulsions when performing a given activity, and persons who indicated to experience obsessions and/or compulsions when performing a given activity), it turned out that those with obsessions and/or compulsions—but not those without obsessions and/or compulsions—reported longer durations for almost all activities than persons without OCD. Possible reasons for longer durations besides the occurrence of obsessions and/or compulsions might be that the durations are also influenced by factors other than OCD symptomatology, such as the amount of food required when grocery shopping, the size of the apartment when cleaning it, and the individual definition of when leaving the apartment begins and ends.

For most activities, a longer duration related weakly but significantly to higher OCD symptom severity. These associations were mostly similar across groups, except that associations between OCD symptomatology and durations of leaving the apartment and writing an email were stronger in persons with OCD with obsessions and/or compulsions. The

Table 3
Descriptive and test statistics for the duration of daily life activities in persons without obsessive–compulsive disorder and persons with obsessive–compulsive disorder as a function of whether they experienced obsessions and/or compulsions or not when performing a given activity.

Activity (minutes)	With obsessions and/or compulsions			Without obsessions and/or compulsions			Persons without obsessive–compulsive disorder			Test statistics		
	n (%)	*Mdn*	*M*	*n (%)*	*Mdn*	*M*	*n (%)*	*Mdn*	*M*	χ^2	*p*	*Effect size*
Leaving the apartment	250 (83.6%)	5[a]	13.44	49 (16.4%)	2[b]	7.45	300 (100%)	5[a]	10.32	18.24	<.001	$\eta^2 = 0.04$
Handwashing	179 (59.9%)	2[a]	5.90	120 (40.1%)	1[b]	1.23	300 (100%)	1[c]	5.22	72.74	<.001	$\eta^2 = 0.19$
Brushing teeth	115 (38.5%)	5[a]	6.55	184 (61.5%)	3[b]	3.01	300 (100%)	3[b]	3.68	80.13	<.001	$\eta^2 = 0.15$
Urinating	140 (46.8%)	4[a]	6.63	159 (53.2%)	2[b]	2.05	300 (100%)	2[c]	2.98	70.70	<.001	$\eta^2 = 0.14$
Changing clothes	196 (65.6%)	5[a]	8.31	103 (34.4%)	2[b]	2.99	300 (100%)	4[c]	5.90	58.70	<.001	$\eta^2 = 0.12$
Bank transfer	151 (50.5%)	7[a]	9.81	148 (49.5%)	2[b]	2.97	300 (100%)	3[b]	4.76	101.81	<.001	$\eta^2 = 0.22$
Defecating	156 (52.2%)	10[a]	19.80	143 (47.8%)	5[b]	5.87	300 (100%)	5[c]	8.65	65.45	<.001	$\eta^2 = 0.15$
Showering without shampooing	187 (62.5%)	15[a]	23.79	112 (37.5%)	6[b]	8.19	300 (100%)	7[b]	9.60	98.49	<.001	$\eta^2 = 0.19$
Showering with shampooing	184 (61.5%)	20[a]	31.20	115 (38.5%)	10[b]	11.87	300 (100%)	10[b]	13.53	81.30	<.001	$\eta^2 = 0.19$
Writing email	154 (51.5%)	10[a]	10.47	145 (48.5%)	3[b]	3.77	300 (100%)	3[b]	4.74	70.91	<.001	$\eta^2 = 0.21$
Eating meal	97 (32.4%)	20[a]	22.12	202 (67.6%)	15[b]	14.62	300 (100%)	15[b]	19.62	32.96	<.001	$\eta^2 = 0.06$
Grocery shopping	198 (66.2%)	30[a]	36.78	101 (33.8%)	25[b]	23.53	300 (100%)	30[a]	36.72	26.59	<.001	$\eta^2 = 0.04$
Cleaning apartment	208 (69.6%)	110[a]	153.87	91 (30.4%)	60[a]	80.09	300 (100%)	60[a]	87.13	10.87	.004	$\eta^2 = 0.04$

Notes. Groups were compared using the median of the duration of daily life activities. Note, however, that the median test compares the frequencies of persons lying below and above the median but—as persons can also have values at the median—it is possible that two groups have the same median but can still differ significantly. Arithmetic means are reported here for transparency but readers should be aware that—in contrast to the median—these values are substantially biased by outliers. Different superscripts indicate significant group differences. Effect size = Eta-squared.

Table 4
Robust percentage bend correlation coefficients for the associations between the duration of daily life activities and obsessive–compulsive symptom severity.

	Obsessive–Compulsive Inventory–Revised			Yale–Brown Obsessive Compulsive Scale		
	pbcor	Test statistics	*p*	*pbcor*	Test statistics	*p*
Leaving the apartment[a]	0.26	6.67	<.001	0.14	3.46	<.001
With obsessions and/or compulsions	–	–	–	0.22	3.61	<.001
Without obsessions and/or compulsions	–	–	–	−0.001	−0.004	.997
Persons without obsessive–compulsive disorder	–	–	–	0.05	0.93	.352
Handwashing	0.24	6.09	<.001	0.16	3.87	<.001
Brushing teeth	0.19	4.72	<.001	0.13	3.20	.001
Urinating	0.23	5.72	<.001	0.12	2.96	.003
Changing clothes	0.18	4.34	<.001	0.11	2.59	.010
Bank transfer	0.23	5.82	<.001	0.17	4.28	<.001
Defecating	0.26	6.44	<.001	0.17	4.33	<.001
Showering without shampooing	0.31	8.01	<.001	0.33	8.57	<.001
Showering with shampooing	0.29	7.27	<.001	0.32	8.14	<.001
Writing email[a]	0.32	8.15	<.001	0.27	6.72	<.001
With obsessions and/or compulsions	0.41	5.46	<.001	0.30	3.79	<.001
Without obsessions and/or compulsions	−0.10	1.21	.229	−0.06	−0.72	.473
Persons without obsessive–compulsive disorder	0.13	2.19	.029	0.06	1.05	.294
Eating meal	0.12	2.96	.003	0.03	0.71	.476
Grocery shopping	0.05	1.26	.207	−0.01	−0.29	.769
Cleaning apartment	0.10	2.39	.017	0.13	3.23	.001

[a] Significant interaction effects (see main text) indicated that associations differed as a function of groups, which is why we report the correlation coefficients separately as a function of group here.

current study, thus, emphasizes the time-consuming character of OCD and the importance of the temporal classification of obsessions and/or compulsions as this might contribute to determine the severity of OCD symptomatology. In addition, as the duration of daily life activities in persons with obsessions and/or compulsions was higher than in persons without OCD for almost all activities, it can be concluded that the obsessions and/or compulsions of persons with OCD do not exclusively refer to specific and selective situations that are typically observed in persons with OCD (e.g., handwashing as a result of fear of contamination). Instead, the time-consuming obsessions and/or compulsions appear to also refer to some part to daily life activities in general.

4.2. Clinical implications

Although existing literature suggests that persons with OCD require more time to perform various daily life activities and experience functional impairments (Eisen et al., 2006; Steketee et al., 1996), the present study is the first that quantifies the time spent performing these tasks and, therefore, has several clinical implications for diagnosis and psychotherapeutic treatment. While the assessment of the duration of daily life activities does not replace established diagnostic procedures, it may contribute to the assessment of relevant obsessions and/or compulsions and the degree of functional impairment. For example, persons with OCD may be unaware or ashamed of obsessions and/or compulsions in certain daily life activities and, thus, may not report these but they may be revealed by above-average durations compared to reference values (Weingarden and Renshaw, 2015).

Therapeutically, one of the main goals in the treatment of persons with OCD is the reduction of time spent on obsessions and/or compulsions. As these also influence daily life activities, the current results can be used to define target and normal behavior, that is, specifically defined durations for affected daily life activities (Koch et al., 2023, p. 88). Resulting from this, clinicians are able to tailor individual exposure exercises by using idiosyncratic stimuli to reduce time spent on those activities. For example, a patient who needs exceptionally longer for showering with shampooing might agree on the therapists' suggestion of conducting self-guided exposure exercises by using a stopwatch when taking a shower. The timer might then be set to alert after 10 min,

indicating the patient to stop showering. Thus, persons with OCD may potentially use reference values of persons without OCD as a guide to relearn how much time should be spent on daily life activities on average (Weingarden and Renshaw, 2015). Yet, the current findings should be replicated in future studies before incorporating these suggestions in clinical practice.

Another implication for psychotherapeutic treatment is that the quantification of time spent on daily life activities may be relevant for therapists, as it could be used to help persons with OCD develop awareness of how long they actually spend on various tasks and what 'normative' amounts of time in the absence of OCD and OCD-specific impairment may look like (Koch et al., 2023, p. 88). As persons with OCD often underestimate the duration of their daily life activities, it can be assumed that behavioral observation (i.e., measurement of the time required to perform a certain activity) and comparing results with reference values of persons without OCD has a therapeutic effect. The feedback of one's own above-average durations in daily life activities can contribute to make the distress of persons with OCD understandable and transparent for therapists and can also support the development of symptom insight in persons with OCD. This is of particular relevance as poor symptom insight is associated with higher OCD symptom severity and higher rates of comorbid disorders, such as depression (Middleton and Hezel, 2019). Furthermore, persons with OCD with low symptom insight are more likely than those with high symptom insight to display weaker responses to first-line treatments, such as cognitive-behavioral therapy with exposure and response prevention (Kishore et al., 2004; Middleton and Hezel, 2019).

One way to strengthen symptom insight is that therapists communicate the individual scores of a person with OCD based on indications of quantity (e.g., "it takes you longer to shower than the majority of a comparison group of persons without OCD"). Thus, the discrepancy in the duration of daily life activities between persons with and without OCD is vividly demonstrated, contributing to an increase in symptom insight. Hence, the present results might contribute to strengthen the motivation and willingness to fully engage in therapy as psychotherapists can show persons with OCD how much more flexibility and free time for positive activities they can achieve by undergoing psychotherapy (Reid et al., 2017).

4.3. Limitations

As in every study, interpretation of the current results is limited to the persons and methods investigated. Hence, the current findings are limited to persons with OCD receiving inpatient treatment and may not necessarily translate to persons with OCD receiving outpatient treatment who mostly have a lower OCD symptom severity, possibly resulting in lower durations of daily life activities (Grøtte et al., 2018). Furthermore, diagnoses were established with unstructured clinical interviews, which might have lower reliability than establishing diagnoses with structured clinical interviews. Additionally, results are limited to the examination of the duration of daily life activities based on self-report which may be biased (e.g., due to recall bias or social desirability; Shiffman et al., 2008). Hence, future studies may record durations of daily life activities by using ecological momentary assessment which has been labeled "a worthy addition to the suite of assessment tools used when working with clients who have OCD" (Tilley and Rees, 2014, p. 1). Ecological momentary assessment can be defined as the repeated collection of real-time data of persons' momentary experiences in their natural environments (Landmann et al., 2020). For example, event-based sampling that requires persons with OCD to report the duration of a given activity at the time or directly after the activity has actually been performed could reduce or avoid biases that are introduced by retrospective reporting (Rupp et al., 2019; Shiffman et al., 2008). This approach could also be combined with instructing persons with OCD to use a stopwatch when reporting the duration of activities (although this may in turn influence the duration of activities).

Future research may also enquire about other reasons for long durations of daily life activities such as depressive symptoms (which is, amongst others, characterized by psychomotor retardation), the use of medication such as antipsychotics (which might also result in persons acting much slower when undertaking daily life activities), and obsessional slowness (Fischer et al., 2021; Lohr et al., 2013; Singh et al., 2013). The latter condition is characterized by particularly slow motor performance which mostly relates to personal hygiene and activities of daily living, such as cleaning the apartment (Ganos et al., 2015; Hoffmann and Hofmann, 2017, p. 43). Although evidence on this condition is sparse, pathophysiology appears to be associated with OCD and might be considered when conducting similar examinations (Ganos et al., 2015). Finally, as evidence on the consequences of longer durations of daily life activities is sparse, future studies may also focus on the implications of those on quality of life as well as interferences with occupation, leisure activities, and interpersonal relationships.

4.4. Conclusions

Results indicate that the duration of a subset of daily life activities in a sample of persons with OCD is higher than in persons without OCD. Instead, the time required for performing a given activity seems to depend more on whether or not a person experiences obsessions and/or compulsions associated with that activity. Yet, this study still shows that many areas of life are affected in which persons with OCD experience obsessions and/or compulsions. Therefore, persons with OCD are more likely to display high durations for various activities in their daily life that are not typically part of core OCD symptoms which possibly results in having less time for positive activities. Hence, an important goal in psychotherapeutic treatment of OCD may be the reduction of the duration of daily life activities. Accordingly, psychotherapists may attempt to motivate persons with OCD to benefit from the newly gained free time and engage in beneficial activities promoting mental health such as physical exercise or fostering friendships (Firth et al., 2019; King et al., 2016).

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Data availability statement

The data set and annotated *R*-code for our main analyses are available at https://osf.io/v37j8/.

CRediT authorship contribution statement

Eva M. Zisler: Data curation, Formal analysis, Methodology, Software, Writing – original draft, Writing – review & editing. **Adrian Meule:** Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Stefan Koch:** Conceptualization, Writing – review & editing. **Rebecca Schennach:** Conceptualization. **Ulrich Voderholzer:** Conceptualization, Supervision, Writing – review & editing.

Declaration of competing interest

The authors report there are no competing interests to declare.

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Anhang A: Artikel III

Discover Mental Health

Research

Willingness to experience unpleasant thoughts, emotions, and bodily sensations at admission does not predict treatment outcome in inpatients with obsessive–compulsive disorder

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Abstract

Background Some persons with obsessive–compulsive disorder (OCD) refuse or drop out of treatment because of the aversive nature of exposure and response prevention therapy when they have to face and tolerate unpleasant thoughts, emotions, and bodily sensations. Indeed, one study suggested that a higher willingness to experience unpleasant thoughts, emotions, and bodily sensations (WTE) predicts a better treatment outcome, but this finding has not been replicated yet.

Methods We examined whether WTE at admission predicted treatment outcome in a sample of 324 inpatients with OCD who received a multimodal treatment that included cognitive-behavioral therapy with exposure and response prevention sessions.

Results Obsessive–compulsive symptoms (based on OCD-specific self-report questionnaires) decreased with medium-to-large effect sizes (all $ps < 0.001$) and global functioning (based on therapist ratings) increased with a large effect size ($d = 1.3$, $p < 0.001$) from admission to discharge. In contrast to previous findings, however, WTE did not predict treatment outcome (all $ps > 0.005$). The effect of WTE on treatment outcome remained non-significant when controlling for any comorbidity, age, sex, length of stay, and antidepressant medication and was not moderated by these variables.

Conclusions Results indicate that higher WTE at the beginning of inpatient treatment does not facilitate improvements in obsessive–compulsive symptoms from admission to discharge. However, they also indicate that lower WTE at the beginning of inpatient treatment does not adversely affect treatment outcome, that is, even patients who indicate that they are unwilling to face the negative experiences associated with exposure and response prevention can still achieve considerable symptom reductions.

Keywords Obsessive–compulsive disorder · Psychotherapy · Exposure and response prevention · Inpatient treatment · Willingness

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1 Introduction

Obsessive–compulsive disorder (OCD) is marked by the occurrence of obsessions, compulsions, or both [1]. These can occur in various forms such as unwanted thoughts about aggressive actions, fears of diseases and contamination, or counting compulsions [2]. It is a relatively common mental disorder as the lifetime prevalence ranges between 1 and 3% in the general population [3]. OCD is rarely limited to a single life episode and often has a chronic course when adequate treatment is lacking [1]. Accordingly, many persons with OCD are severely impaired in their daily life and experience substantial distress resulting from their OCD symptomatology [4]. Thus, effective treatment of patients with OCD is of high relevance.

According to international guidelines for the treatment of OCD, psychotherapeutic methods—cognitive-behavioral therapy (CBT) with exposure and response prevention (ERP) in particular—are considered the most effective treatment for OCD [5–7]. This treatment is comprised of systematic exposures to disorder-specific triggers which usually provoke distress, refraining from conducting rituals or avoidance, and cognitive interventions which facilitate learning in exposure sessions [5]. CBT including ERP can be considered very effective in reducing obsessive–compulsive symptoms with large effect sizes of $g = 1.33$ [8].

Despite research providing considerable evidence for the effectiveness of ERP, studies still report dropout rates of 20% in patients with OCD [9, 10]. Amongst others, this might be due to the aversive nature of ERP which challenges the patients to face and tolerate the occurrence of obsessional distress [11]. Hence, in order to successfully undergo ERP, the patient must display high willingness to experience unpleasant thoughts, emotions, and bodily sensations (WTE).

Reid and colleagues [11] investigated 288 adults with OCD receiving residential treatment and assessed self-reported WTE in patients with OCD at three points of measurement: before ERP, immediately after ERP as well as concerning future-exposure WTE. Results showed that higher WTE at all points of measurement was associated with larger symptom reductions. This might be due to several reasons such as high WTE potentially contributing to a reduction in patients' use of dysfunctional cognitive, behavioral and emotional avoidance strategies during ERP [11]. For example, patients with low WTE may use covert avoidance behaviors (e.g., suppressing thoughts) during ERP, resulting in residual symptoms after successful psychotherapeutic treatment [12, 13]. Furthermore, higher WTE might add to improved extinction learning which is resistant to spontaneous recovery and generalizes to a higher number of stimuli not involved in ERP sessions [11]. Also, there is evidence that high WTE might be linked to mindfulness and enhanced attentional resources as those with increased WTE may have more attentional capacities at their disposal leading to spending less effort in suppressing upcoming thoughts [11]. In sum, the authors thus concluded that WTE may be a clinically relevant marker of ERP response [11].

The current study aimed to replicate the finding by Reid and colleagues [11] that higher WTE predicts better treatment outcome in persons with OCD and extend it to a different sample (which, e.g., also included adolescents and received a longer inpatient treatment than the sample studied by Reid and colleagues). To this end, we analyzed clinical records of persons with OCD who had completed a measure of WTE at admission to treatment. We expected that higher WTE would predict better treatment outcome, that is, larger decreases in obsessive–compulsive symptoms (as measured with self-report questionnaires) and larger increases in global functioning (based on therapist ratings) from admission to discharge.

2 Method

2.1 Sample characteristics

Data of inpatients with OCD who were treated at the Schoen Clinic Roseneck (Prien am Chiemsee, Germany) between 2020 and 2022 were analyzed. The treatment provided in the hospital complies with the German S3-guidelines for the treatment of OCD [14]. Therefore, patients received a multimodal treatment that included symptom-specific, individual CBT and ERP sessions, psychotherapeutic group sessions (e.g., based on Acceptance and Commitment Therapy) as well as other treatment elements, depending on indication (e.g., psychopharmacological medication). Data of 324 inpatients with OCD who completed the WTE measure at admission were available. Note that sample

Table 1 Descriptive and test statistics for obsessive–compulsive symptoms and global functioning at admission and discharge

N = 324	Admission				Discharge				Test statistics		
	n	*M*	*SD*	Range	*n*	*M*	*SD*	Range	*Effect size*	*W*	*p*
Obsessive–Compulsive Inventory–Revised											
Washing	322	6.50	4.32	0–12	198	4.01	3.78	0–12	$r_{rb} = 0.79$ ($d = 0.74$)	11410.50	< 0.001
Obsessing	322	8.58	3.13	0–12	198	5.77	3.47	0–12	$r_{rb} = 0.84$ ($d = 0.92$)	14141.00	< 0.001
Hoarding	322	2.88	2.87	0–12	198	2.43	2.69	0–12	$r_{rb} = 0.34$ ($d = 0.25$)	6334.50	< 0.001
Ordering	322	4.98	3.84	0–12	198	3.20	3.30	0–12	$r_{rb} = 0.77$ ($d = 0.68$)	9869.00	< 0.001
Checking	322	6.05	3.78	0–12	198	3.75	3.23	0–12	$r_{rb} = 0.88$ ($d = 0.88$)	12231.00	< 0.001
Neutralizing	322	3.80	4.16	0–12	198	2.38	3.40	0–12	$r_{rb} = 0.65$ ($d = 0.49$)	6479.50	< 0.001
Total Score	322	32.79	12.46	2–69	198	21.53	13.16	1–61	$r_{rb} = 0.90$ ($d = 1.05$)	17737.00	< 0.001
Yale–Brown Obsessive Compulsive Scale											
Obsessions	320	12.42	4.02	0–20	199	8.44	4.11	0–19	$r_{rb} = 0.82$ ($d = 0.87$)	15453.00	< 0.001
Compulsions	320	12.53	4.08	0–20	199	8.23	4.17	0–19	$r_{rb} = 0.86$ ($d = 0.96$)	16166.00	< 0.001
Total Score	320	24.94	6.76	5–39	199	16.66	7.39	0–38	$r_{rb} = 0.89$ ($d = 1.08$)	17490.50	< 0.001
Global Assessment of Functioning	277	44.96	7.07	20–65	277	56.26	9.54	20–98	$r_{rb} = -0.97$ ($d = -1.27$)	504.00	< 0.001
Clinical Global Impression—improvement scale	–	–	–	–	278	2.42	0.87	1–6	–	–	–

r_{rb} = matched-pairs rank biserial correlation coefficient, d = Cohen's d

size differs for the different analyses because of missing data (Table 1). At the Schoen Clinic Roseneck, data from the diagnostic assessments (e.g., age, sex, diagnoses, medication, length of stay, questionnaire scores) are automatically transferred to a database from which they can be exported without any identifying information by authorized employees. Thus, accessing individual patient charts is not necessary. According to the guidelines by the institutional review board of the LMU Munich, retrospective studies conducted on already available, anonymized data are exempt from requiring ethics approval.

The majority of patients (79.0%, $n = 256$) had mixed obsessional thoughts and acts (ICD–10 code F42.2), 14.5% ($n = 47$) had predominantly compulsive acts (ICD–10 code F42.1), and 6.5% ($n = 21$) had predominantly obsessional thoughts or ruminations (ICD–10 code F42.0). Mean age was 30.86 years ($SD = 13.16$, Range = 13–70). Two-hundred and seventy-four patients (84.6%) were adults and 50 patients (15.4%) were adolescents. One-hundred and ninety-six patients (60.5%) were female and 128 patients (39.5%) were male. Two-hundred and thirty-eight patients (73.5%) had at least one comorbid mental disorder. The most common comorbid mental disorders were affective disorders (ICD–10 code F3, $n = 206$, 63.3%), anxiety disorders (ICD–10 code F4, $n = 67$, 20.7%), and eating disorders (ICD–10 code F5, $n = 20$, 6.2%). Mean length of stay was 80.84 days ($SD = 38.55$, Range = 2–238). One-hundred and fifty-six patients (56.9%, information missing for 50 patients) received antidepressant medication.

2.2 Measures

Willingness to experience unpleasant thoughts, emotions, and bodily sensations (WTE). Similar to Reid and colleagues [11], we assessed WTE at admission with a single question: "How high do you currently rate your willingness to welcome all unpleasant thoughts, feelings, and bodily sensations in the context of planned exposures without avoiding them?". Responses were recorded on an eleven-point scale from 0 = *very little/little willing* to 10 = *very high/very willing*.

Obsessive–Compulsive Inventory–Revised (OCI–R). The German version [15] of the OCI–R [16] was used to measure obsessive–compulsive symptoms at admission and discharge. The OCI–R is an 18-item self-report questionnaire with six subscales: washing, checking, ordering, obsessing, hoarding, and neutralizing. Responses are recorded on a five-point scale ranging from 0 = *not at all* to 4 = *extremely*, referring to the extent of experienced distress during the past month due to OCD symptoms. Internal reliability coefficients for the six subscales and the total scale ranged between ω = 0.77–0.86 at admission and between ω = 0.84–0.90 at discharge.

Yale–Brown Obsessive Compulsive Scale (Y–BOCS). The German version [17] of the Y–BOCS [18] was used to measure OCD severity at admission and discharge. The Y–BOCS is a 10-item self-report questionnaire with two subscales: obsessions and compulsions. Responses are recorded on a five-point scale ranging from 0 = *no symptoms* to 4 = *extreme symptoms*.

Internal reliability coefficients for the two subscales as well as the total scale ranged between ω = 0.82–0.86 at admission and between ω = 0.89–0.91 at discharge.

Global Assessment of Functioning (GAF). The GAF (American Psychiatric 19) [19]was used to measure patients' global functioning. Here, therapists rated patients' global functioning before admission (retrospectively) and at discharge on a scale from 1 = *severely impaired* to 100 = *extremely high functioning*.

Clinical Global Impression–Improvement Scale (CGI). The CGI [20] was used to measure change in global functioning during the inpatient stay. Here, therapists rated at discharge if, how much, and in which direction patients' global functioning changed during treatment on a scale from 1 = *very much improved* and 7 = *very much worse*.

2.3 Data analyses

Data were analyzed with *R* version 4.2.1 [21], *RStudio* version 2022.07.1 [22] and *JASP* version 0.16.4.0 [23]. As some measures were ordinally scaled (WTE, CGI), we used non-parametric and robust techniques for all analyses. Changes in obsessive–compulsive symptoms and global functioning from admission to discharge were tested with Wilcoxon signed-rank tests. Cross-sectional associations between WTE and obsessive–compulsive symptoms and global functioning at admission were examined with robust percentage bend correlation coefficients with the *WRS2* package version 1.1–4 [24, 25].

Longitudinal associations between WTE and treatment outcome measures were tested with robust linear regressions using the *robustbase* package version 0.95–0 [26]. Specifically, separate models were calculated for all treatment outcome measures (i.e., all OCI–R subscale scores and the total score, both Y–BOCS subscale scores and the total score, GAF, CGI) with WTE and the respective admission scores (except CGI, which was only measured once) as independent variables and discharge scores as dependent variable. To examine whether including potential confounding variables affected the longitudinal associations between WTE and treatment outcome, we further ran the same models again while controlling for any comorbidity, age, sex, length of stay, and antidepressant medication. Finally, we also examined whether these variables moderated any longitudinal associations between WTE and treatment outcome by testing interactive effects between WTE and any comorbidity, age, sex, length of stay, and antidepressant medication, respectively, in separate models for each treatment outcome measure and each moderator variable.

For all robust regression models, all continuous variables were *z*-standardized so that all regression coefficients represent standardized coefficients. Because of the numerous inferential tests, we considered effects significant at $p < 0.005$, as has been suggested by others [27]. The data and *R* code with which all robust correlation and robust regression coefficients can be reproduced are available at https://osf.io/rzvuq/.

3 Results

Mean WTE ratings at admission were 6.81 ($SD = 2.53$, Range = 0–10). Obsessive–compulsive symptoms decreased and global functioning increased from admission to discharge (Table 1).[1] WTE was uncorrelated with obsessive–compulsive symptoms and global functioning at admission (Table 2) and did not predict treatment outcome (Table 3).[2] The effect of WTE on treatment outcome remained non-significant when controlling for any comorbidity, age, sex, length of stay, and antidepressant medication ($bs = -0.18$–0.03, all $ps \geq 0.005$) and was not moderated by these variables (interaction effects $bs = -0.25$–0.29, all $ps > 0.019$).

[1] As some patients had unexpectedly low Y–BOCS scores at admission, we re-ran analyses with patients that had a Y–BOCS score ≥ 18, similar to other studies (e.g., [34]). Yet, results were very similar to those with the full sample (Table S1 in the supplementary material).

[2] Again, results were very similar when re-running analyses with the subsample of patients with Y–BOCS scores ≥ 18, that is, WTE did not predict treatment outcome (Table S2 in the supplemental material).

Table 2 Percentage bend correlation coefficients for the relationships of willingness to experience unpleasant thoughts, emotions, and bodily sensations with obsessive–compulsive symptoms and global functioning at admission

	r_{pb}	99.5% CI	*p*
Obsessive–Compulsive Inventory–Revised			
Washing	0.01	− 0.15; 0.16	0.914
Obsessing	0.005	− 0.15; 0.16	0.932
Hoarding	− 0.10	− 0.25; 0.06	0.073
Ordering	− 0.05	− 0.20; 0.09	0.361
Checking	0.05	− 0.11; 0.21	0.344
Neutralizing	− 0.004	− 0.17; 0.15	0.944
Total Score	− 0.01	− 0.16; 0.15	0.895
Yale–Brown Obsessive Compulsive Scale			
Obsessions	− 0.08	− 0.23; 0.08	0.153
Compulsions	− 0.14	− 0.29; 0.03	0.014
Total score	− 0.12	− 0.27; 0.03	0.028
Global Assessment of Functioning	0.13	− 0.04; 0.29	0.029
Clinical Global Impression–improvement scale	− 0.12	− 0.29; 0.05	0.045

r_{pb} = robust percentage bend correlation coefficients

Table 3 Standardized coefficients of the robust linear regression models, in which willingness to experience unpleasant thoughts, emotions, and bodily sensations and admission scores were used as independent variables to predict treatment outcome measures at discharge

Dependent variable	Admission scores			Willingness to experience unpleasant thoughts, emotions, and bodily sensations		
	b	*SE*	*p*	*b*	*SE*	*p*
Obsessive–Compulsive Inventory–Revised						
Washing	0.70	0.06	< 0.001	0.02	0.06	0.756
Obsessing	0.60	0.05	< 0.001	− 0.15	0.06	0.012
Hoarding	0.72	0.12	< 0.001	− 0.02	0.05	0.726
Ordering	0.70	0.05	< 0.001	− 0.07	0.05	0.216
Checking	0.69	0.05	< 0.001	− 0.11	0.05	0.046
Neutralizing	0.79	0.04	< 0.001	− 0.06	0.05	0.163
Total Score	0.63	0.05	< 0.001	− 0.11	0.06	0.057
Yale–Brown Obsessive Compulsive Scale						
Obsessions	0.44	0.06	< 0.001	− 0.07	0.06	0.273
Compulsions	0.46	0.07	< 0.001	− 0.05	0.07	0.438
Total score	0.45	0.06	< 0.001	− 0.06	0.07	0.328
Global Assessment of Functioning	0.45	0.05	< 0.001	0.04	0.05	0.471
Clinical Global Impression–improvement scale	–	–	–	− 0.09	0.06	0.118

4 Discussion

4.1 Summary of results

In the current study, obsessive–compulsive symptoms decreased and global functioning increased with medium-to-large effect sizes, supporting findings about the effectiveness of inpatient treatment for OCD. Yet, WTE at admission to treatment was neither related to obsessive–compulsive symptoms and global functioning cross-sectionally nor related to treatment outcome longitudinally. Controlling for covariates and examining moderators did not change these findings. Our results are in contrast to the findings by Reid and colleagues [11] who found higher WTE to be associated with larger symptom reductions in inpatients after several weeks of treatment. Of note, however, is that we used a conservative threshold for considering effects as significant, suggesting that using a less conservative

threshold may have resulted in some significant effects of WTE on treatment outcome. However, when looking at the effect sizes in the current study, it turns out that while the direction of effects was as expected for almost all dependent variables (i.e., higher WTE associated with better treatment outcome), all effects were small (all standardized regression coefficients < 0.2). Therefore, even if WTE significantly relates to treatment outcome in larger samples, it appears that the clinical relevance of this effect may be negligible.

4.2 Clinical implications

This study showed that WTE does not have a significant predictive value for self-reported as well as expert-rated treatment outcome measures in inpatients with OCD. Thus, the results indicate that lower WTE at the beginning of inpatient treatment does not adversely affect treatment outcome. From a clinical point of view, it may be that some patients seem highly motivated to experience unpleasant thoughts, emotions, and bodily sensations during ERP at the beginning of treatment but nevertheless, are unable to fully engage in ERP sessions and still apply some (covert) avoidance behaviors. Furthermore, patients who claim to be unwilling to face negative experiences associated with ERP at admission might still be able to get fully involved in those exercises and achieve considerable symptom reductions. Yet, although the current results indicate that WTE at the beginning of treatment only plays a minor role at most in treating OCD, it may be that the role of WTE increases during treatment. For example, Reid and colleagues [11] who found that higher WTE predicted better treatment outcome assessed WTE multiple times in the course of treatment, suggesting that there may be session-to-session changes in WTE and obsessive–compulsive symptoms which might show a dynamic interplay as therapy progresses.

4.3 Limitations

As in every study, interpretation of the current results is limited to the sample and methods investigated. For example, WTE was measured by a single-item measure. Although using a single-item measure arguably has higher clinical feasibility, future studies might construct a multi-item measure to assess WTE to possibly increase the accuracy of measurement. Furthermore, WTE was assessed based on self-report, which may be biased (e.g., due to demand effects). Thus, future studies are necessary that examine the reliability and validity of self-reported WTE in greater detail, for example, by comparing effects of self-reported WTE with therapist-rated WTE. Another possibility might be to develop a behavioral test for assessing WTE. For example, the Behavioral Avoidance Test (BAT; [31])—which measures how willing a person is to approach symptom-provoking situations or thoughts during OCD-specific tasks—has been found to predict treatment outcome in persons with OCD [28–30]. Future studies might examine whether there is an association between the BAT and self-reported WTE and, thus, whether the BAT may in fact be considered a behavioral measure of WTE. Such studies may then contrast self-reported and behavioral WTE as predictors of treatment outcome.

5 Conclusions

In conclusion, results indicate that WTE does not have a significant predictive value for self-report as well as expert-rated treatment outcome measures in inpatients with OCD. This indicates that lower WTE at the beginning of inpatient treatment does not adversely affect treatment outcome which means that even patients who claim to be unwilling to face the negative experiences associated with exposure and response prevention can still achieve considerable symptom reductions. Accordingly, other therapeutic treatment factors may arguably play a greater role than WTE at admission in inpatient treatment [32, 33]. Yet, future studies may examine session-to-session changes in WTE as well as obsessive–compulsive symptoms during treatment which may reveal a dynamic interplay as therapy progresses.

Author contributions Eva M. Zisler: Data analysis, Writing - original draft, Writing - review & editing. Adrian Meule: Conceptualization, Methodology, Writing - original draft, Writing - review & editing. Stefan Koch: Conceptualization, Writing - review & editing. Ulrich Voderholzer: Conceptualization, Supervision, Writing - review & editing.

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Data availability The data set and annotated *R*-code for our main analyses are available at https://osf.io/rzvuq/.

Declarations

Competing interests The authors report there are no competing interests to declare.

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Anhang B: Artikel IV

Original Paper

Effectiveness of One Videoconference-Based Exposure and Response Prevention Session at Home in Adjunction to Inpatient Treatment in Persons With Obsessive-Compulsive Disorder: Nonrandomized Study

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Abstract

Background: Therapist-guided exposure and response prevention (ERP) for the treatment of obsessive-compulsive disorder (OCD) is frequently conducted within clinical settings but rarely at places where patients are usually confronted with OCD symptom-provoking situations in daily life (eg, at home).

Objective: This study aimed to investigate patients' views on 1 ERP session at home via videoconference and its impact on treatment outcome.

Methods: A total of 64 inpatients with OCD received 1 session of therapist-guided videoconference-based ERP at home in adjunction to a multimodal inpatient treatment between 2015 and 2020.

Results: Compared with 64 age- and sex-matched controls who received a multimodal inpatient treatment without 1 session of videoconference-based ERP at home, patients who received 1 session of videoconference-based ERP in adjunction to a multimodal inpatient treatment showed stronger reductions in OCD symptom severity from admission to discharge. Before the videoconference-based ERP session, patients reported high rationale credibility and treatment expectancy. After the videoconference-based ERP session, patients reported medium-to-high positive mood as well as depth and smoothness of the session, and they perceived the working alliance as high.

Conclusions: Results highlight the importance of administering therapist-guided ERP sessions in patients' natural environment to enhance treatment response in OCD. Videoconference-based ERP as add-on to treatment as usual is, therefore, a promising approach to facilitate the application of ERP in patients' natural environment and foster the generalization of ERP conducted in clinical settings.

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KEYWORDS

obsessive-compulsive disorder; videoconference-based treatment; therapy; exposure; response prevention; OCD; prevention; inpatient; video; videoconference; therapist; therapists; mood; positive mood; environment; clinical setting

Introduction

Background

Obsessive-compulsive disorder (OCD) is a mental disorder characterized by intrusive and disturbing thoughts as well as repetitive patterns of behavior [1,2]. These are often multifaceted, that is, they include different obsessions and compulsions related to unwanted intrusive thoughts, fears of diseases, and contamination, among others [2,3]. OCD is a common disorder with a lifetime prevalence ranging from 1% to 3% and often has debilitating consequences on the daily functioning, well-being, and quality of life of affected persons as well as family members [4,5]. It usually emerges in late adolescence or early adulthood and has a chronic course if effective treatment is lacking [6,7]. Yet, OCD is often underrecognized and missed in primary care settings [8]. Thus, the duration of untreated illness in adults often exceeds 10 years, which creates a large treatment gap [9].

Exposure and Response Prevention in the Treatment of OCD

Cognitive-behavioral therapy (CBT) with exposure and response prevention (ERP) is the first-line, evidence-based psychotherapeutic treatment for OCD and is recommended as the psychotherapeutic method of choice [10-12]. ERP is a crucial element in CBT for OCD and requires patients to "engage in repeated, prolonged exposure to obsessions while refraining from compulsions" ([13], p. 85) [14]. Recent evidence stemming from inhibitory learning theory suggests that patients learn new associations during ERP (eg, "dirt—no fatal disease"), which in turn inhibit existing maladaptive associations (eg, "dirt—fatal disease" [15]). This acquisition of associations is enabled by expectancy violation that is a mismatch between patients' expectancy and outcome [15]. Although ERP is particularly useful in reducing OCD symptomatology, many patients find it difficult to endure upcoming unpleasant cognitions, feelings, and bodily sensations [16].

Besides the challenging nature of ERP itself, patients with OCD receiving CBT with ERP have to face a variety of difficulties [16]. First, patients are required to understand the underlying principles and measures of a treatment that is referred to as rationale credibility [17]. Second, patients need to expect that the treatment they are undergoing is effective [17-19]. Finally, it is beneficial if a positive working alliance is established between the patient and psychotherapist as it appears to predict treatment outcome [20]. Despite patients having to face various challenges when undergoing ERP, this psychotherapeutic intervention is highly effective for many people with OCD [21].

Home-Based ERP

The most commonly applied form of ERP is therapist-guided ERP in clinical settings (eg, at inpatient wards and in offices of psychotherapists), although the intervention can possibly be provided in several ways and facilities [22]. However, as persons with OCD often face the occurrence of obsessions and compulsions at home and feared situations or triggers cannot be replicated in a hospital or office, it can be hypothesized that home-based ERP may be beneficial in the treatment of OCD [23]. Although the theoretical framework of administering ERP at patients' homes may sound reasonable, evidence on this treatment variant is mixed. Although some studies found that ERP at home was slightly advantageous in terms of symptom reduction [24,25], others reported that home-based ERP was no more effective than standard office-based ERP [23].

There are a variety of reasons why home-based ERP is not administered on a regular basis by the majority of psychotherapists. Specifically, many clinicians lack time or familiarity with this intervention [22,26,27]. Additionally, specialized hospitals are not always located close to the patient's home, making therapist-guided ERP in the patient's living environment difficult to conduct. Even with outpatient therapy close to the patient's home, there is the challenge of therapists having to travel to the patient's place, which is difficult to implement due to limited time resources of therapists. Therefore, patients often receive outpatient treatment that only includes a limited number of therapist-assisted exposure sessions, if any [22,28].

To achieve a better care situation for patients with OCD, there are 2 cost-effective ways of implementing therapist-guided home-based ERP. The first option is telephone-supported ERP, which was shown to be effective in 2 studies [29,30]. With advancing technologies, the second option is videoconference-based ERP, which can also be considered an adequate tool that comes with significant reductions in obsessive-compulsive symptoms, especially in persons with moderate OCD symptoms [27,31-33]. Videoconference-based psychotherapy has several advantages over in-person psychotherapy. First, by using videoconference-based psychotherapy, treatment with ERP can easily be delivered to patients who are homebound or living in rural areas [31,34]. Second, the administration of home-based in vivo exposures allows the generalization of treatment effects to other contexts [31,34]. Third, the therapist is in charge of accompanying and supporting the patient during ERP [35]. Fourth, therapist-assisted ERP has been shown to be more effective than non–therapist-assisted ERP [36], and using videoconference at home might allow for even more therapist-assisted ERP.

This Study

As research on videoconference-based ERP is still limited, we examined treatment effects in patients who received inpatient treatment with an additional videoconference-based ERP at home compared with an age- and sex-matched group of patients who received inpatient treatment without an additional videoconference-based ERP at home. Second, we assessed patients' views on the current intervention (ie, treatment expectancy and rationale credibility) before undergoing the videoconference-based ERP session. Third, we examined patients' evaluations of the videoconference-based ERP session (ie, depth, smoothness, positivity, and arousal) and working alliance with the therapists after having received videoconference-based ERP. We expected stronger reductions in OCD symptom severity in patients who received inpatient treatment with an additional videoconference-based ERP session at home compared with inpatients who received multimodal inpatient treatment without an additional videoconference-based

ERP session at home from admission to discharge. Furthermore, we expected high ratings on rationale credibility and treatment expectancy before as well as high ratings on satisfaction with the therapeutic sessions and quality of the therapeutic relationship from the patients' perspective after the videoconference-based ERP session at home.

Methods

Sample Characteristics

This study was a nonrandomized, 2-group design study, in which a subset of patients who voluntarily participated in the study (videoconference exposure group) were compared with another subset of patients who did not participate in the study (control group). Although this design has disadvantages compared with a randomized controlled trial (RCT; see the *Discussion* section), it can be conducted more conveniently (eg, is less expensive and requires less resources) and may even have higher external validity as randomization may influence participation and outcomes when patients have a treatment preference [37]. Inpatients with OCD treated at the Schoen Clinic Roseneck (Prien am Chiemsee, Germany) between 2015 and 2020 were investigated. In Germany, inpatient treatment is indicated if at least 1 of the following factors applies: absence of or nonresponse to guideline-based disorder-specific outpatient treatment, danger to life, severe neglect, compulsive and avoidant behavior that is either severe or habitual resulting in an inability to maintain a normal daily routine and adherence to outpatient treatment, severe suffering and impairment of psychosocial functioning, psychological or somatic comorbidities aggravating outpatient treatment, and a particularly disease-promoting environment [10,38]. The treatment provided at the Schoen Clinic Roseneck adheres to the German S3 guidelines for the treatment of OCD [10]. Thus, the therapeutic concept is multimodal and consists of symptom-specific, individual CBT and ERP sessions, and other treatment elements, depending on indication (eg, psychopharmacological medication; see Table 1).

Table 1. Sample characteristics (N=128).

Characteristic	Videoconference exposure group (n=64)	Control group (n=64)	Test statistics				
			Chi-square (*df*)	*U*	*V*	*P* value	r_{rb} (*d*)
Subtype of obsessive-compulsive disorder (ICD-10[a] code), n (%)			1.62 (N/A[b])	N/A	0.11	.44	N/A
Obsessions-only subtype (F42.0)	0 (0)	1 (2)					
Compulsions-only subtype (F42.1)	8 (13)	11 (17)					
Mixed subtype (F42.2)	56 (88)	52 (81)					
Sex (female), n (%)	42 (66)	46 (72)	0.58 (N/A)	N/A	0.07	.45	N/A
Age (years), mean (SD)	26.95 (12.26)	29.28 (13.78)	N/A	1888.00	N/A	.45	–0.08 (–0.18)
Length of stay (days), mean (SD)	93.33 (30.54)	85.88 (38.40)	N/A	2302.50	N/A	.23	0.12 (0.22)
Any comorbid mental disorder, n (%)	44 (69)	43 (67)	0.04 (N/A)	N/A	0.02	.85	N/A
Affective disorders	32 (50)	34 (53)	0.13 (N/A)	N/A	0.03	.72	N/A
Anxiety disorders	11 (17)	16 (25)	1.17 (N/A)	N/A	0.10	.28	N/A
Eating disorders	6 (9)	4 (6)	0.43 (N/A)	N/A	0.06	.51	N/A
Antidepressant medication[c], n (%)	28 (49)	23 (51)	0.04 (N/A)	N/A	0.02	.84	N/A
Total score of Obsessive-Compulsive Inventory—Revised at admission, mean (SD)	31.56 (12.62)	31.32 (14.89)	N/A	2095.00	N/A	.83	0.02 (0.02)
Total score of Yale-Brown Obsessive-Compulsive Scale at admission, mean (SD)	23.63 (5.33)	22.57 (6.51)	N/A	2202.50	N/A	.46	0.08 (0.18)

[a]ICD-10: International Classification of Diseases, Tenth Revision.

[b]N/A: not applicable.

[c]Information missing for 7 patients in the videoconference exposure group and 19 patients in the control group.

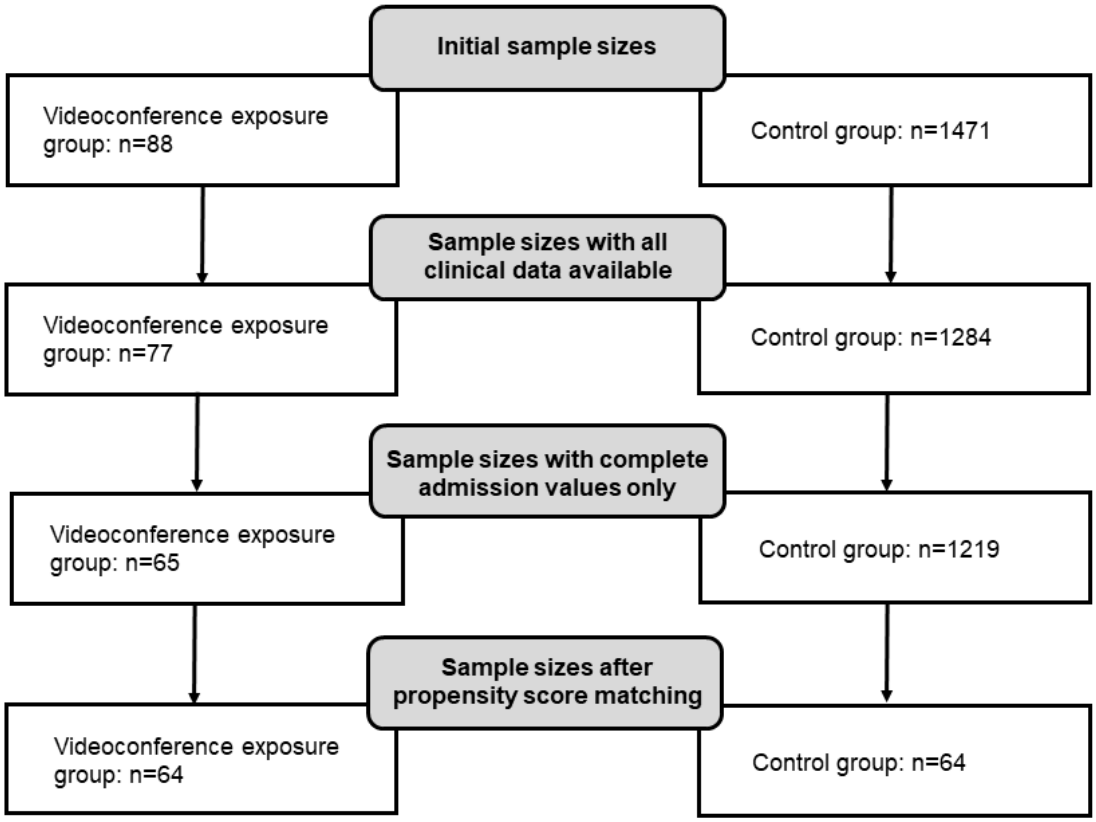
A total of 88 inpatients participated in this study, that is, received 1 videoconference-based ERP session at home in addition to inpatient treatment. As inpatient treatment at the Schoen Clinic Roseneck consists of 3 phases (psychoeducation and motivation, ERP, and transfer to the patients' homes), participating patients were in the third phase of inpatient treatment. Psychotherapists at the hospital who had undergone technical training on videoconference-based ERP were authorized to offer the

intervention to their patients. Patients were free to choose whether or not to receive the additional videoconference-based ERP session at home. On average, persons who received videoconference-based ERP at home had moderate OCD symptom severity according to the self-report version of the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS; mean sum score 23.63, SD 5.33; Table 1; see recommendations by Cervin et al [39]).

Inpatients with OCD who were treated at the hospital within the same time period but who did not receive a videoconference-based ERP session at home were selected as the control group. Yet, these patients also received therapist-guided ERP in the hospital. Similar to the persons having received the videoconference-based ERP session, persons in the control group had, on average, moderate symptom severity according to the Y-BOCS (mean sum score 22.57, SD 6.51; Table 1; see recommendations by Cervin et al [39]). At the Schoen Clinic Roseneck, data from diagnostic assessments (eg, age, sex, diagnoses, medication, length of stay, and questionnaire scores) are automatically transferred to a database from which they can be exported without any identifying information by authorized employees. Thus, accessing individual patient charts is not necessary.

Between 2015 and 2020, a total of 1471 patients with OCD were treated in the hospital who did not receive videoconference-based ERP at home, that is, did not take part in the study. Because of missing data, 1219 patients were available for matching with 65 of the 88 patients in the videoconference exposure group (Figure 1). Groups were matched based on propensity score matching without replacement using the FUZZY extension for SPSS (version 27.0; IBM Corp) [40]. Data were matched in regard to the variables age, sex, any comorbidity, length of stay, Obsessive-Compulsive Inventory–Revised (OCI-R) scores at admission, and Y-BOCS scores at admission. Using a match tolerance with which all 65 persons in the videoconference exposure group were retained did not result in well-matched groups (ie, groups still differed in age and length of stay). Thus, a match tolerance of 0.019 was chosen, which led to the exclusion of 1 person from the videoconference exposure group, resulting in a final sample size of 128 (ie, 64 persons per group; Table 1).

Figure 1. Participant flowchart.



Measures

OCI-R Questionnaire

The OCI-R [41,42] was used to examine obsessive-compulsive symptoms. The OCI-R is an 18-item self-report questionnaire with 6 subscales: washing, checking, ordering, obsessing, hoarding, and neutralizing. Responses are recorded on a 5-point scale ranging from 0 (not at all) to 4 (extremely) and refer to the extent of distress during the past month due to OCD symptoms. In a previous study, internal reliability coefficients for the 6 subscales ranged between α=.76 and .95. In this study, the internal reliability coefficient for the total scale was ω=0.82 at admission and ω=0.86 at discharge.

Y-BOCS Questionnaire

The self-report version [43] of the Y-BOCS [44,45] was used to examine OCD severity. The Y-BOCS is a 10-item self-report questionnaire comprising 2 subscales: obsessions and compulsions. Responses are recorded on a 5-point scale ranging from 0 (no symptoms) to 4 (extreme symptoms). Internal reliability coefficients ranged between α=.78 and .88 in 2 validation studies [46,47] and between ω=0.83 and 0.91 in this study. Convergent validity has been supported by high correlations with other measures for obsessive-compulsive symptomatology, and divergent validity has been supported by moderate correlations with measures for related but distinct constructs such as worry [48-50].

Credibility Expectancy Questionnaire

The Credibility Expectancy Questionnaire (CEQ) [17] was used to assess the rationale credibility and treatment expectancy of the patient. The CEQ is a 6-item self-report questionnaire with 2 subscales: rationale credibility and treatment expectancy. Responses are recorded on a 9-point scale ranging from 1 (not at all) to 9 (very much). Internal reliability coefficients for the subscales ranged between ω=0.71 and 0.88.

Session Evaluation Questionnaire

The Session Evaluation Questionnaire (SEQ) [51] was used to examine the patients' satisfaction with the therapeutic sessions. The SEQ is a 21-item self-report questionnaire with 4 subscales: depth, smoothness, positivity, and arousal. Responses are recorded on a 7-point scale ranging from 1 (unpleasant) to 7 (pleasant). Internal reliability coefficients for the subscales ranged between ω=0.61 and 0.87. A closer inspection revealed that 2 items (1=slow, 7=fast; 1=moved, 7=composed) contributed to a low internal reliability of the arousal subscale. After removing those items, the remaining items of the arousal subscale had an internal reliability of ω=0.76. Thus, internal reliability coefficients for the subscales then ranged between ω=0.76 and 0.87.

Working Alliance Inventory—Short Revised

The Working Alliance Inventory—Short Revised (WAI-SR) [52] was used to examine the quality of the therapeutic relationship from the patient's perspective. The WAI-SR is a 12-item self-report questionnaire with 3 subscales: task, goal, and bond. Responses are recorded on a 7-point scale ranging from 1 (never) to 7 (always). Internal reliability coefficients for the subscales and the total scale ranged between ω=0.84 and 0.88.

Procedure

The videoconference app "VidyoMobile" by Vidyo, Inc was used to enable visual and auditory communication between the patient and therapist [25]. Patients were taught by a research staff member on how to use the smartphone, the tripod, and the videoconference app. Moreover, therapists prepared ERP sessions with their patients in close detail in a preceding session in the hospital. Before the ERP session, patients completed the CEQ. Patients received 1 videoconference-based ERP session each at home either on Friday afternoon or Monday morning. Each session had a duration of 2 hours on average. All videoconference-based ERP sessions were conducted by therapists specialized in CBT and ERP, and only the patient and the therapist were attending the session. The primary goal of the videoconference-based ERP session was to practice difficult situations associated with obsessions and compulsions in the patient's home. The therapist's role was to encourage the patient to face upcoming unpleasant feelings, emotions, and bodily sensations and to accompany them emotionally [16]. The exact execution of actions during ERP (ie, turning off the stove without checking, washing hands only once, etc) was not controlled by the therapist so as to give the patient a sense of personal responsibility in their own home.

After the ERP session, patients completed the SEQ and WAI-SR. In addition, after the videoconference-based ERP session, patients were asked to continue practicing the exposure exercise on their own. These exercises were not accompanied by the therapist, but debriefing followed in subsequent therapy sessions. Questionnaires assessing symptom severity (ie, OCI-R and Y-BOCS) were completed by the patients at admission and discharge.

Data Analyses

Group differences on categorical variables (OCD subtype, sex, comorbid mental disorders, and antidepressant medication) were tested with χ^2 tests and on continuous variables (age, length of stay, and questionnaire scores at admission) with Mann-Whitney *U* tests. Due to missing data at discharge (OCI-R: n=28, Y-BOCS: n=26), we examined changes of OCI-R and Y-BOCS total scores from admission to discharge as a function of a group with robust linear mixed models, which include cases with missing data in the maximum likelihood estimation. For this, we used R [53] and RStudio [54] and, specifically, the R package *robustlmm* [55]. The 2 models (1 for OCI-R scores and 1 for Y-BOCS scores) included fixed effects of time (admission vs discharge), group (videoconference exposure group vs control group), and their interaction term as well as a random intercept (ie, person-level random variability in scores at admission). As the package *robustlmm* does not produce parameter-specific *P* values, we used the workaround by Geniole et al [56]. Specifically, nonrobust models were fitted with the *lme4* package [57], *P* values were obtained with the package *lmertest* [58], and Satterthwaite-approximated degrees of freedom generated by the *lme4* models were combined with the output of the *robustlmm* model [56,59].

Ethical Considerations

The study was approved by the ethics committee of the Psychological Department of the Philipps University of Marburg, Germany. According to the guidelines by the institutional review board of the LMU Munich, retrospective analyses on already available anonymized data are exempt from requiring ethics approval. All participants in the videoconference exposure group signed informed consent before taking part in the study.

Results

As can be seen in Table 1, both groups did not significantly differ in age, sex, having any comorbid mental disorder, OCD subtype, antidepressant medication, OCI-R total scores at admission, and Y-BOCS total scores at admission. Robust linear mixed models revealed statistically significant interactions for group time for OCI-R (b=6.27; P=.01) and Y-BOCS (b=4.58; P<.001) scores, indicating that OCD symptom changes from admission to discharge differed as a function of group. As can be seen in Figures 2 and 3, the videoconference exposure group had larger OCD symptom reductions from admission to discharge than the control group. Descriptive statistics for obsessive-compulsive symptoms (total scores for OCI-R and Y-BOCS) at admission and discharge in the videoconference exposure and control groups are displayed in Table 2. On a scale ranging from 1 to 9, patients had mean (SD) values of 8.03 (0.74) on the subscale *rationale credibility* and 7.24 (1.13) on the subscale *treatment expectancy* on the CEQ. On a scale ranging from 1 to 7, patients had mean (SD) values of 5.87 (0.97) on the subscale *depth*, 3.60 (1.29) on the subscale *smoothness*, 4.61 (1.43) on the subscale *positivity*, and 4.11 (1.30) on the (reduced) subscale *arousal* on the SEQ. On a scale ranging from 1 to 7, patients had mean (SD) values of 6.25 (0.65) on the subscale *therapeutic tasks*, 6.52 (0.60) on the subscale *therapeutic goals*, 6.34 (0.75) on the subscale *therapeutic bond*, and 6.37 (0.57) on the total scale of the WAI-SR.

Figure 2. Mean sum scores of the Obsessive-Compulsive Inventory—Revised at admission and discharge as a function of group. The error bars indicate the SE of the mean. Effect sizes (rank biserial correlation coefficients r_{rb} and Cohen d) refer to the changes within each group from admission to discharge.

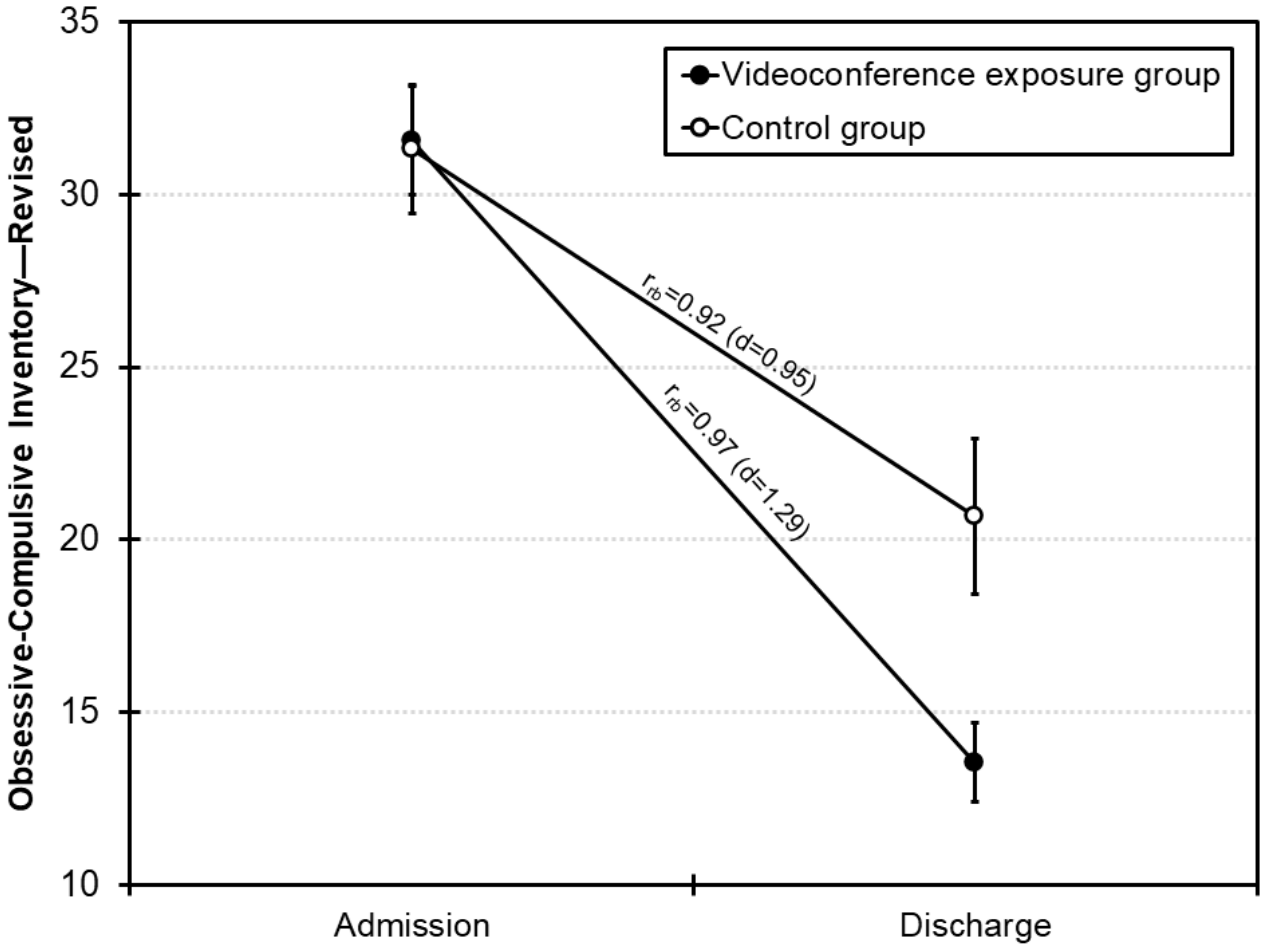


Figure 3. Mean sum scores of the Yale-Brown Obsessive-Compulsive Scale at admission and discharge as a function of group. The error bars indicate the SE of the mean. Effect sizes (rank biserial correlation coefficients r_{rb} and Cohen d) refer to the changes within each group from admission to discharge.

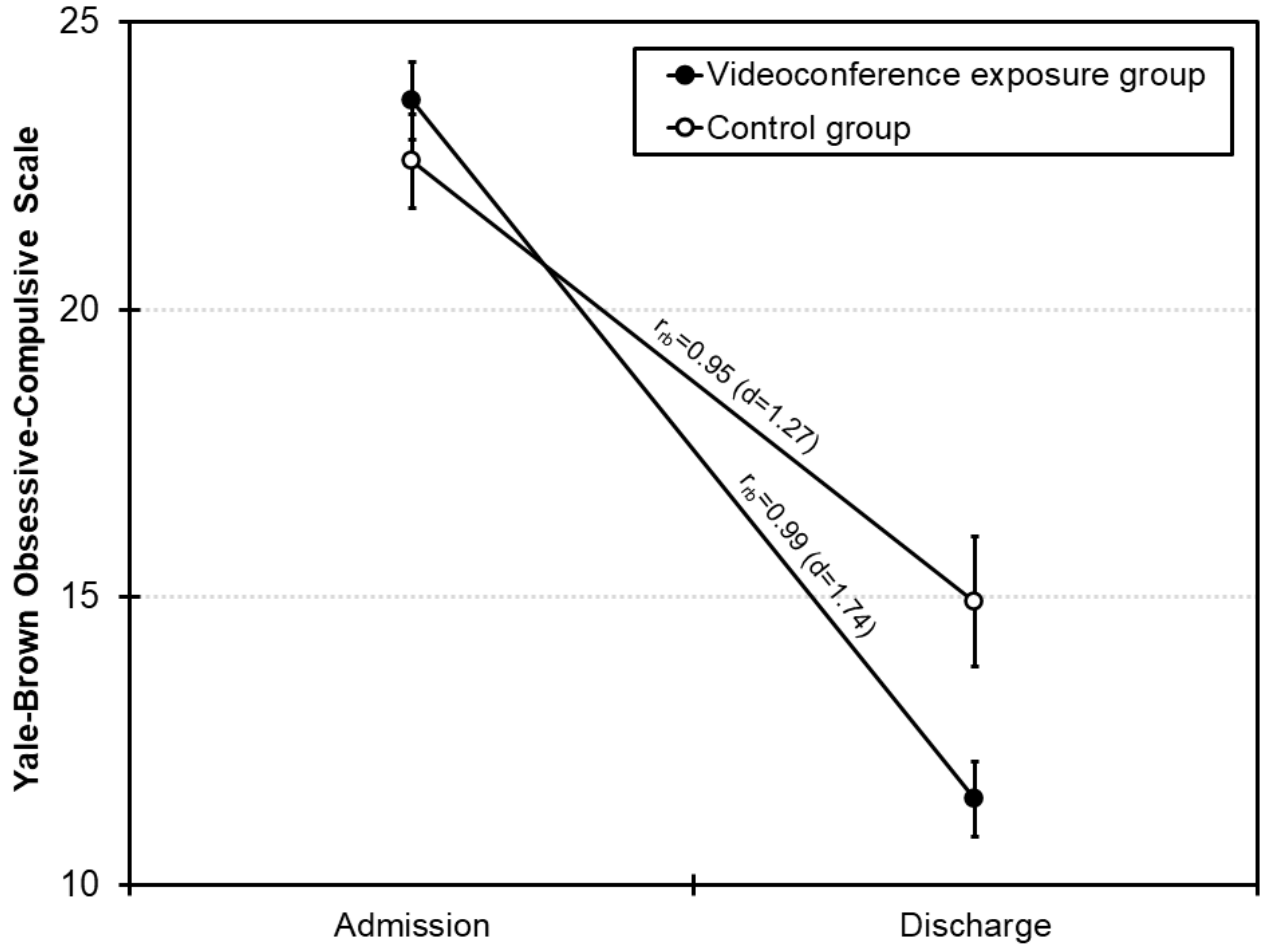


Table 2. Descriptive statistics for obsessive-compulsive symptoms at admission and discharge in the videoconference exposure and control groups.

Time point and statistic	Videoconference exposure group			Control group		
	n (%)	Mean (SD)	Range	n (%)	Mean (SD)	Range
Admission						
Obsessive-Compulsive Inventory—Revised	64 (50)	31.56 (12.62)	6-56	64 (50)	31.32 (14.89)	3-59
Yale-Brown Obsessive-Compulsive Scale	64 (50)	23.63 (5.33)	9-36	64 (50)	22.57 (6.51)	5-35
Discharge						
Obsessive-Compulsive Inventory—Revised	57 (44.5)	13.54 (8.59)	1-35	43 (33.6)	20.67 (14.81)	3-56
Yale-Brown Obsessive-Compulsive Scale	56 (43.8)	11.48 (4.88)	1-25	46 (35.9)	14.92 (7.67)	1-31

Discussion

Summary of Results

This study showed that the group that had an additional therapist-guided, videoconference-based ERP session at home showed greater improvements during inpatient treatment for OCD, that is, displayed larger decreases in OCD symptomatology compared with treatment as usual. Obsessive-compulsive symptoms from admission to discharge decreased for patients who received a videoconference-based ERP session at home as well as for patients who received treatment as usual without a videoconference-based ERP session with medium to large effect sizes. Yet, obsessive-compulsive symptoms decreased even stronger for patients who have received inpatient treatment and a videoconference-based ERP session as an add-on. Furthermore, patients had high treatment

expectancy and perceived the rationale as credible before receiving videoconference-based ERP. After undergoing videoconference-based ERP, patients perceived depth (ie, potency and value), smoothness of the session (ie, comfort and relaxation), and mood after the session (ie, positivity and arousal) as medium to high. Patients who received videoconference-based ERP rated working alliance (ie, agreement on therapeutic tasks and goals as well as therapeutic bond) with their therapist as high.

Possible Mechanisms of Videoconference-Based ERP-Enhanced Symptom Reductions

Our results revealed that patients who received videoconference-based ERP at home in adjunction to a multimodal inpatient treatment had higher symptom reductions from admission to discharge with higher effect sizes than the control group. This might be significantly attributable to patients being able to generalize and extend their progresses achieved in the hospital to their own home; that is, with the help of the personal support of their therapist, they are more successful in giving up avoidance behavior at home as well [60]. Yet, it must be considered that there was no randomization in this study, which is why factors other than the additional videoconference-based ERP session might have also contributed to the reduction in OCD symptomatology from admission to discharge.

Alternative explanations for higher OCD symptom reductions in the videoconference exposure group might be that mostly patients who were highly motivated decided to participate in the additional videoconference-based ERP session or that the psychotherapists who treated patients receiving videoconference-based ERP were more motivated compared with other psychotherapists who treated the other patients with traditional ERP in the hospital only. Additionally, it might be possible that psychotherapists themselves expected that the additional ERP session at home would be beneficial for the patients and, thus, were highly engaged in the therapeutic sessions in the hospital as well, which particularly helped patients in reducing their OCD symptoms.

Despite methodological restrictions in nonrandomized study designs such as this study, there are also several disadvantages in RCTs that must be taken into account. First, participants are no passive recipients of interventions and do have treatment preferences. Patients with specific treatment preferences might, thus, refuse to take part in RCTs to avoid being randomized to the nonpreferred treatment, which reduces external validity [37]. Second, patients included in RCTs are strongly preselected, which was not the case in this study. Thus, the characteristics of patients included in this study correspond more to the real care situation. Third, internal validity of RCTs could be reduced as randomization to the nonpreferred treatment might influence patient adherence to the treatment protocol [37]. Accordingly, as this study was a nonrandomized study, patients were able to express and act on their treatment preferences as they could choose to receive the additional videoconference-based ERP session at home. This might have substantially increased patient adherence, which could, in turn, have been a factor contributing to reductions in OCD symptomatology. Furthermore, the 2 groups in this study were matched based on propensity score matching, which aims to account for absent randomization as it imitates some of the characteristics of an RCT [61]. Propensity score matching helps to strengthen causal arguments in observational studies by reducing selection bias [62].

Besides significant reductions in OCD symptomatology from admission to discharge in patients in the videoconference exposure group, the current results indicate that patients mainly had positive views on the videoconference-based ERP session, which became apparent in positive subjective ratings of the sessions. The positive effects of the videoconference-based ERP session on OCD symptomatology might be due to several change factors (ie, treatment expectancy and working alliance) that appear to be targeted in the videoconference setting to a sufficient degree. Several studies have provided evidence that treatment expectancy and understanding of the underlying treatment rationale are powerful predictors of psychotherapy outcome in general [18]. Additionally, as patients rated working alliance in the videoconference setting as high, this might also substantially contribute to the effects shown in this study. Previous studies have already shown that the videoconference setting enables the patient and psychotherapist to establish a strong and stable working alliance that is comparable to that in traditional face-to-face treatment [63,64]. Several studies even highlight that a positive working alliance is predictive of substantial decreases in symptomatology [31]. Although this study cannot show causal associations between working alliance and symptom reductions, a positive working alliance might substantially be linked to improvements of the patients' condition in the face-to-face and videoconference setting.

Limitations

As in every study, interpretation of the current results is limited to the persons and methods investigated. First, the examination of obsessive-compulsive symptoms was based on self-report, and—although the instruments used (OCI-R and Y-BOCS) are characterized by high validity and reliability—future studies may include therapist-rated measurements (eg, Y-BOCS interview version, Clinical Global Impression-Improvement Scale, and Global Assessment of Functioning [65,66]) as the inclusion of multiple views on the patients' OCD symptomatology allows for an even more comprehensive evaluation. Second, due to limited material and human resources in the hospital, only a subset of patients treated at the hospital received an additional videoconference-based ERP session at home. Therefore, future studies might make the treatment available to a larger sample and replicate the effect. Third, future studies might examine the effects of multiple videoconference-based ERP sessions as the current add-on intervention included only 1 ERP session. Fourth, there was no randomization in this study. Hence, there might also be a number of factors other than the additional videoconference-based ERP session at home that might have contributed to significant OCD symptom reductions (eg, motivation to engage in ERP might have differed between the 2 groups and different therapists administered ERP sessions). Thus, conducting RCTs is recommended for future studies.

Conclusions

Altogether, this study showed that the group that received a 1-time home visit of videoconference-based ERP in adjunction to a multimodal inpatient treatment had greater improvements, that is, larger decreases in OCD symptomatology, during inpatient treatment of OCD compared with treatment as usual. In addition, patients' ratings showed that the videoconference setting as well as working alliance with therapists was largely perceived as pleasant. Overall, it is recommended to provide patients with OCD with therapist-guided ERP at home. If it is not possible to accompany the intervention in person due to time constraints or other issues, videoconference-based therapy is a promising alternative to facilitate the application of ERP in patients' natural environment and foster the generalization of treatment effects achieved in clinical settings.

Data Availability

The data sets generated during and/or analyzed during this study are available in the Open Science Framework repository (https://osf.io/pybhw/).

Conflicts of Interest

None declared.

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Abbreviations

CBT: cognitive-behavioral therapy
CEQ: Credibility Expectancy Questionnaire
ERP: exposure and response prevention
OCD: obsessive-compulsive disorder
OCI-R: Obsessive-Compulsive Inventory—Revised
RCT: randomized controlled trial
SEQ: Session Evaluation Questionnaire
WAI-SR: Working Alliance Inventory—Short Revised
Y-BOCS: Yale-Brown Obsessive-Compulsive Scale

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Effects of acceptance-based strategies on psychological responses to disorder-relevant stimuli in inpatients with obsessive–compulsive disorder: An experimental study

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ABSTRACT

Background and objectives: Preliminary findings suggest that acceptance and commitment therapy-informed exposure therapy may be an effective treatment for obsessive–compulsive disorder (OCD). However, there is a lack of experimental studies that have examined immediate effects of acceptance-based strategies during exposure to disorder-relevant stimuli in persons with OCD.

Methods: Fifty-three inpatients (64% female) with OCD participated in an experimental study during which they were exposed to obsessive–compulsive washing-relevant pictures and were instructed to either passively view these pictures for 5 s (neutral condition), to accept their feelings (acceptance condition) or to intensify their feelings (exposure condition) for 90 s each.

Results: The acceptance condition led to higher acceptance and lower unpleasantness of patients' current feelings compared to the neutral condition and to lower strength of obsessions and urge to perform compulsions but only when compared to the exposure condition. Higher self-reported OCD symptom severity related to higher unpleasantness and strength of obsessions, particularly in the neutral condition.

Limitations: Future studies need to test whether the current findings translate to other stimuli and other forms of obsessions and compulsions. Due to the short duration, the exposure condition might have only mimicked the early phase of exposure and response prevention.

Conclusions: Acceptance-based strategies during cue exposure immediately increase acceptance of and reduce unpleasant feelings. In line with the rationale of acceptance-based treatment approaches, which do not aim at immediate disorder-specific symptom reductions, effects on obsessions and compulsions may be more delayed or require repeated training sessions.

1. Introduction

Obsessive–compulsive disorder (OCD) is characterized by repetitive and persistent thoughts, images, or impulses that are intrusive, unwanted, and usually associated with anxiety. Persons with OCD attempt to ignore or suppress these obsessions or try to neutralize them by performing compulsions (World Health Organization, 2022). The recommended treatment of choice for OCD is cognitive-behavioral therapy with exposure and response prevention (ERP), which reduces obsessive–compulsive symptoms with large effect sizes (Öst et al., 2015). There are several underlying mechanisms contributing to the effectiveness of ERP such as extinction and expectancy violation (Elsner et al., 2022). Extinction relies on within- and between-session habituations, that is, the decline of distress or fear. Expectancy violation, that is, a mismatch between expectancy and feared outcome, enables the acquisition of new associations showing the affected person that previously feared stimuli

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are not associated with danger.

Although ERP is an evidence-based method coming along with substantial symptom reductions in patients with OCD, many patients find it difficult to endure upcoming unpleasant feelings, cognitions, and bodily sensations (Reid et al., 2017). Therefore, a large number of patients refuse ERP, drop out prematurely, do not adhere to treatment instructions, do not achieve clinically significant reductions in symptom severity, or relapse shortly after treatment (Bürkle et al., 2021). Thus, there is a need to develop ways to increase treatment acceptability, adherence, and consistency of treatment response. One of such ways may be acceptance and commitment therapy (ACT), which falls within the broad category of cognitive-behavioral therapies but uses a more experiential and contextual approach. It targets six psychological processes, all of which are aimed at supporting behavioral flexibility: acceptance, defusion, self as context, contact with the present moment, values, and committed action (Twohig, 2009). To date, there is a large number of case reports examining the application of ACT for the treatment of OCD (cf. Philip & Cherian, 2021, 2022) but few randomized controlled trials that examined effectiveness of ACT compared to other interventions. This handful of studies suggest that ACT appears to be superior to certain interventions (e.g., progressive muscle relaxation, antidepressant medication) but equally effective as ERP for reducing obsessive–compulsive symptoms (Fabricant et al., 2013; Twohig et al., 2010; Zemestani et al., 2022).

Instead of contrasting ERP and ACT as stand-alone treatments, combining both approaches has received increased interest in recent years. The use of ERP is consistent with ACT as it offers the ultimate experiential form of practicing acceptance and other ACT processes. In contrast to traditional approaches to ERP, however, targeting mechanisms such as inhibitory learning or expectancy violation is of lesser importance in ACT-informed ERP (Elsner et al., 2022). Instead, ERP within an ACT framework emphasizes willingness to experience anxiety as the main process of change, that is, accepting inner experiences to occur without taking steps to regulate or control them (Twohig et al., 2015). As with general ACT for OCD, there are some case studies suggesting that ACT combined with ERP successfully reduces obsessive–compulsive symptoms (Capel et al., 2023; Laurito et al., 2022; Petersen et al., 2022). In a randomized controlled trial, however, both ERP and ACT combined with ERP were equally effective in reducing obsessive–compulsive symptoms (Twohig et al., 2018).

Although ACT-informed ERP appears to be an effective way to reduce obsessive–compulsive symptoms, there is a gap in the literature when it comes to experimental studies that rigorously examine immediate effects of acceptance-based strategies during exposure to disorder-relevant stimuli and that contrast these effects to appropriate control conditions. It has been observed, for example, that long-term outcomes of ACT are often better than immediately after therapy (Twohig, 2009). This may be because the purpose of exposure exercises from an ACT framework is to help patients practice acceptance and mindfulness processes while heading in valued directions while there is no concern for the overall effect on form, frequency, or situational sensitivity of the obsession. Thus, ACT-informed exposure may immediately increase acceptance of unpleasant feelings but there may be a delayed effect on obsessive–compulsive symptoms. In a recent study, however, experiential delivery of acceptance practice was associated with less OCD symptom severity the following week (Ong et al., 2022), indicating that beneficial effects of ACT-informed ERP can already be observed in the short term. Thus, it is currently unclear if ACT-informed ERP only has delayed or also immediate effects. In summary, research on this topic is very sparse and requires further investigation.

In the current study, inpatients with OCD participated in a within-subjects experimental study, during which they were exposed to obsessive–compulsive washing-relevant pictures as fear of contamination and washing are among the most common obsessions and compulsions in persons with OCD and cues provoking obsessive–compulsive washing symptoms are sufficiently homogenous for an experimental study (Højgaard et al., 2018). In this task, patients were instructed to either passively view these pictures (neutral condition), to accept their feelings (acceptance condition) or to intensify their feelings (exposure condition). In the exposure condition, patients were instructed to expose themselves to their current feeling without avoiding it through distraction strategies, similar to instructions used during traditional ERP. We expected that patients would be better able to accept their current feeling and, accordingly, to find this feeling less unpleasant in the acceptance condition than in the other two conditions. In addition, we tested whether the acceptance condition would also lead to immediate reductions in strength of obsessions and urge to perform compulsions compared to the other conditions. Finally, we also explored whether OCD symptom severity would be related to the ratings (i.e., acceptance, unpleasantness, strength of obsessions, urge to perform compulsions) and whether this relationship would be moderated by the experimental conditions.

2. Method

2.1. Participants

Inpatients with OCD who were treated at the Schoen Clinic Roseneck (Prien am Chiemsee, Germany) or Schoen Clinic Bad Bramstedt (Bad Bramstedt, Germany) between 2018 and 2021 were invited to participate in this study at the beginning of treatment before the first ERP session took place. The inpatient treatment offered at the hospitals adheres to the German S3-guidelines for the treatment of OCD (Hohagen et al., 2015; Voderholzer et al., 2022) in terms of admission criteria, treatment elements, and therapy goals. Thus, patients received a cognitive-behavioral therapy-oriented, multimodal OCD treatment that included several treatment elements such as individual psychotherapy sessions, group therapy sessions, and other treatment elements depending on indication (e.g., psychopharmacological medication). A power analysis (Faul et al., 2007) indicated that a sample size of approximately N = 50 would be sufficient to detect a small-to-medium effect (f = 0.10–0.25) with 80% power and alpha = .05 in an analysis of variance for repeated measures. There is currently no established way to estimate sample size for linear mixed models, especially when clustering within both stimuli and participants, which is why we chose this calculation as a rough estimate. In total, 53 patients participated ($n = 46$ at the Schoen Clinic Roseneck, $n = 7$ at the Schoen Clinic Bad Bramstedt), all of which were adults (age: $M = 28.8$ years, $SD = 8.5$, Range 18–52). Thirty-four participants (64.2%) were female and 19 participants (35.8%) were male. Specific diagnoses of OCD subtype, comorbid mental disorders, and prescribed psychopharmacological medication are displayed in Table 1. When examining mean subscale scores of the Obsessive–Compulsive Inventory–Revised (OCI–R; see below), the most common obsessive–compulsive symptoms were washing ($M = 2.9$, $SD = 1.1$) and obsessing ($M = 2.5$, $SD = 1.1$), followed by checking ($M = 1.4$, $SD = 1.2$), ordering ($M = 1.2$, $SD = 1.1$), neutralizing ($M = 1.1$, $SD = 1.2$), and hoarding ($M = 0.7$, $SD = 0.9$). Yale–Brown Obsessive Compulsive Scale (Y–BOCS; see below) total scores were moderate to high ($M = 20.9$, $SD = 7.5$). All patients who agreed to participate completed the study (except that the task ended prematurely for one participant due to technical issues but data of this participant were still included in the analyses).

2.2. Interview and self-report measures

Structured Clinical Interview for DSM–IV Axis I Disorders (SCID–I). The German version of the SCID–I (First et al., 1996; Wittchen et al., 1997) was used for establishing OCD diagnoses as well as diagnoses of comorbid mental disorders. Note that the study started in 2018 before the German DSM–5 version of the SCID (Beesdo-Baum et al., 2019) was released, which is why the DSM–IV version was used. In a previous study, interrater reliability (Kappa coefficient) for major depressive

Table 1
Sample characteristics.

	N	%
OCD subtype (ICD–10 code)		
Obsessions-only subtype (F42.0)	1	2%
Compulsions-only subtype (F42.1)	7	13%
Mixed subtype (F42.2)	45	85%
Comorbid mental disorders[a]		
No comorbidity	18	34%
Affective disorders[b]	27	51%
Anxiety disorders[c]	11	21%
Post-traumatic stress disorder	2	4%
Eating disorders	9	17%
Obsessive–compulsive personality disorder	1	2%
Psychopharmacological medication		
Prescribed medication	24	45%
No medication	24	45%
Information not available	5	9%
Medication by type[d]		
Selective serotonin reuptake inhibitors	18	75%
Serotonin-norepinephrine reuptake inhibitors	4	46%
Tricyclic antidepressant	1	4%
Antipsychotics	3	13%
Benzodiazepines	1	4%

Notes. OCD = Obsessive–Compulsive Disorder, ICD = International Classification of Diseases.
[a] Note that several participants had more than one comorbidity.
[b] Including one case of bipolar type-II disorder.
[c] Including one case of hypochondria.
[d] Note that several participants received more than one specific medication.

disorder, anxiety disorders, and somatoform disorders ranged between κ = 0.70–1.00 (Segal et al., 1993).

Obsessive–Compulsive Inventory–Revised (OCI–R). The German version of the OCI–R (Foa et al., 2002; Gönner et al., 2007) was used for examining sample characteristics (see above). This 18-item questionnaire has six subscales with three items each that assess the following obsessive–compulsive symptoms: washing, checking, ordering, obsessing, hoarding, and neutralizing. Responses are recorded on a five-point scale ranging from 0 = *not at all* to 4 = *extremely*, referring to the extent of distress experienced during the past month. In a previous study, internal reliability coefficients (Cronbach's alpha) for the six subscales ranged between α = 0.76–0.95 (Gönner et al., 2007). In the current study, internal reliability coefficients (McDonald's omega; cf. Hayes & Coutts, 2020) for the six subscales ranged between ω = 0.81–0.90.

Yale–Brown Obsessive Compulsive Scale (Y–BOCS). The German version of the self-report version of the Y–BOCS (Rosenfeld et al., 1992; Schaible et al., 2001) was used for measuring obsessive–compulsive symptom severity. This 10-item questionnaire has two subscales with five items each that assess severity of obsessions and compulsions. Responses are recorded on a five-point scale ranging from 0 = *no symptoms* to 4 = *extreme symptoms*. We only used the total score in the current analyses. In a previous study, the internal reliability coefficient (Cronbach's alpha) for the total score was α = 0.89 (Goodman et al., 1989). In the current study, the internal reliability coefficient (McDonald's omega; cf. Hayes & Coutts, 2020) for the total scale was ω = 0.90.

2.3. Experimental task

Eight pictures depicting scenes provoking obsessive–compulsive washing symptoms (e.g., dirty toilet, syphon, or cleaning utensils) were selected from the Maudsley Obsessive–Compulsive Stimuli Set (Mataix-Cols et al., 2009). We used visual stimuli for provoking obsessive–compulsive symptoms in participants as meta-analytic evidence shows that visual induction procedures are generally capable of inducing considerable OCD symptom levels in clinical samples with large effect sizes, especially in patients with obsessive–compulsive washing and fear of contamination (De Putter et al., 2017). The task consisted of eight blocks for each participant. In each block, one picture was displayed for 5 s while participants passively viewed it (neutral condition). After this, participants rated how unpleasant their current feeling was on an 11-point scale anchored 0 = *not unpleasant* and 10 = *very unpleasant*, how easy it was for them to accept unpleasant thoughts and feelings on an 11-point scale anchored 0 = *not easy* and 10 = *very easy*, how strong their urge to compulsions was on an 11-point scale anchored 0 = *not strong* and 10 = *very strong*, and how strong their obsessive thoughts were on an 11-point scale anchored 0 = *not strong* and 10 = *very strong*. After this, the picture was displayed a second time but now for 1.5 min while an auditory instruction was played, which either instructed participants to accept their feelings (acceptance condition) or to intensify their feelings (exposure condition). Auditory instructions were used to allow participants to fully focus on the visual stimuli and not having to read instructions in parallel to the visual cues. The acceptance instruction was based on a training manual on emotional competence (Berking, 2015) and the exposure instruction was based on a cognitive-behavioral treatment manual for OCD (Lakatos & Reinecker, 2016).

In the acceptance instruction, participants were reminded that unpleasant feelings, that is, anxiety, tension, or disgust as well as bodily sensations, that is, elevated heart rate, accelerated respiration, or sweating are part of being human and transient by nature. Participants were told to notice arising sensations and accept their presence without wanting to change them. In the exposure instruction, participants were asked to focus on the details of the stimuli and to envision the concerns associated with the pictures shown. Additionally, participants were told to obsess about arising imaginations so that it becomes similar to obsessive concerns in real life situations. Participants were also asked to not refrain from any thoughts which would reduce unpleasant feelings or distract themselves as the goal of the practice is to fully experience arising sensations, feelings, and emotions. The exposure condition conceptually corresponds to an ERP as in both situations participants are asked to be intensely aware of their upcoming unpleasant feelings, emotions, and bodily sensations and not distract themselves by using any strategy. Both instructions can be found in full length at https://osf.io/whmcy.

Note that we did not use a completely balanced within-subjects design, in which each participant viewed each picture under the three conditions (neutral vs. acceptance vs. exposure). That is, while each participant viewed each of the eight pictures in the neutral condition, they viewed only four of them in the acceptance condition and four of them in the exposure condition. This was done to reduce the total duration of the task and, thus, participants' burden. To cancel out order effects, the sequence of conditions and pictures were counterbalanced between subjects. Specifically, there were two different condition sequences, one of which started with the acceptance condition (A–E–E–A–A–E–E–A) and one of which started with the exposure condition (E–A–A–E–E–A–A–E). Moreover, there were two different picture sequences, one of which displaying pictures 1–2–3–4–5–6–7–8 and one of which displaying pictures 2–1–4–3–6–5–8–7. Thus, by combining the different condition and picture sequences, there were four different orders in total and each participant performed the task in one of these orders. An overview of the stimuli and task design can be found at https://osf.io/whmcy. The task was set up and run with Presentation® version 21.0 (Neurobehavioral Systems, Inc., Berkeley, CA).

2.4. Procedure

The study was approved the by institutional review board of the LMU Munich (Project no. 777-16). All participants signed informed consent before commencing the study. At a first testing session, the SCID–I was conducted by a trained psychotherapist and participants completed the OCI–R, Y–BOCS, and other questionnaires that were not analyzed for this report (Beck Depression Inventory–II, Acceptance and Action Questionnaire–II). At a second testing session (which took place within a

few days after the first one), participants performed the experimental task, which lasted approximately 30 min. Participants were reimbursed with 20,- € Amazon vouchers.

2.5. Data analyses

All analyses were conducted using *R* (R Core Team, 2022) and *RStudio* (RStudio Team, 2022) with the *lme4* package (Bates et al., 2015). Four linear mixed models were run to estimate effects of either acceptance or exposure conditions on unpleasantness, acceptance of thoughts, urge to compulsions, and on strength of current obsessive thoughts compared to the neutral condition. We used restricted maximum likelihood estimation due to the moderate sample size. Condition was entered as a fixed effect whereas random intercepts for both patients and stimuli were computed to account for differences in between individuals and stimuli difficulty. Including study center as a covariate did not result in improved model fit for all four models (ΔAIC <1.7; $\chi^2 \leq 3.73$, $p \geq .053$). In a second set of models, grand mean-centered Y–BOCS total scores and their interaction with conditions were added to the model. Post-hoc comparisons and interaction analyses were conducted using the *emmeans* (Lenth, 2021) and *effects* (Fox, 2003) packages. The Bonferroni–Holm procedure (Holm, 1979) was applied model-wise to account for multiple testing when comparing different experimental conditions (four comparisons in main models, eight comparisons in moderation models).

3. Results

3.1. Differences in outcome ratings between conditions

We found statistically significant main effects for experimental condition in all four models (unpleasantness: F (2; 774.25) = 12.80, $p <$ .001; acceptance of thoughts and feelings: F (2; 773.77) = 11.34, $p <$ .001; strength of obsessions: F (2; 773.16) = 10.46, $p <$ .001; urge to perform compulsions: F (2; 774.14) = 3.21, p = .041). Applying an acceptance-based strategy when looking at disorder-relevant stimuli resulted in statistically significantly less unpleasantness and more acceptance of unpleasant thoughts and feelings compared to both the neutral and exposure condition (Table 2A/B; Fig. 1). However, acceptance-based strategies resulted in lower strength of obsessions and urge to perform compulsions only when compared to the exposure condition but not when compared to the neutral condition (Table 2C/D; Fig. 1). Interestingly, when instructed to intensify their current feelings, patients reported only stronger obsessions and unpleasantness but not higher urge to perform compulsions or lower acceptance of thoughts and feelings when compared to the neutral condition (Table 2; Fig. 1).

3.2. Associations between outcome ratings and Y–BOCS scores as a function of conditions

In a second set of models, we investigated whether experimental conditions (i.e., accepting vs. intensifying thoughts and feelings) would moderate the relationships between OCD symptom severity (i.e., Y–BOCS total scores) and the four outcome measures. Experimental condition moderated the association between OCD symptom severity and unpleasantness (F (2; 757.42) = 7.99, $p <$ .001) and strength of obsessions (F (2; 756.37) = 6.06, p = .002) but not for acceptance of thoughts and feelings (F (2; 757.14) = 0.78, p = .457) or urge to perform compulsions (F (2; 757.32) = 2.62, p = .074). Fig. 2 depicts the moderation effects. To examine the nature of these moderation effects, we tested differences in the size of the associations between outcome ratings and Y–BOCS scores between the three experimental conditions. The association between higher Y–BOCS scores and higher unpleasantness ratings was significantly larger in the neutral condition (b = 0.089) than both in the acceptance condition ($b <$ 0.001; t (758) = 3.26, p = .001) and the exposure condition ($b <$ 0.001, t (758) = 3.26, p = .001). Furthermore, the association between higher Y–BOCS scores and higher strength of obsessions was significantly larger in the neutral condition (b = 0.142) than both in the acceptance condition (b = 0.072; t (756) = −2.61, p = .009) and the exposure condition (b = 0.061, t (756) = −3.04, p = .002). Thus, these moderation effects indicate that the effect of OCD severity on these outcome measures was attenuated in both experimental conditions (all comparisons can be found at https://osf.io/whmcy).[2]

4. Discussion

In the current study, participants felt less unpleasant and accepted their unpleasantness feelings more when using acceptance-based strategies compared to the control conditions during exposure to OCD-relevant cues. Using acceptance-based strategies lead to lower strength of obsessions and urge to perform compulsions compared to the exposure condition only. Higher self-reported OCD symptom severity related to higher unpleasantness and strength of obsessions, particularly in the neutral condition.

Results indicate that acceptance-based strategies immediately reduce unpleasant feelings associated with OCD-relevant cues and, thus, support studies which showed that ACT is a useful framework for ERP (Ong et al., 2022; Twohig et al., 2018). However, OCD-specific symptoms (i.e., strength of obsessions and urge to perform compulsions) were not reduced compared to passively viewing OCD-relevant cues. Yet, "reductions in the frequency, intensity, and duration of experiences such as dysfunctional beliefs, anxiety, and obsessions are generally not explicitly targeted when exposure is used from the ACT perspective" (Twohig et al., 2015, p. 167). Thus, these results are in line with the rationale of ACT-informed interventions and earlier observations that disorder-specific symptom reductions may not be found immediately after therapy but that there are delayed symptom improvements at follow-up measurements (Twohig, 2009).

Expectedly, the exposure condition—using instructions from traditional ERP—did not affect acceptance of unpleasant feelings. Instead, it increased unpleasantness and strength of obsessions compared to the neutral condition. This might be explained by the fixed duration of 90 s, which was necessary to standardize experimental conditions and limit the overall duration of the task. Specifically, while the exposure condition and traditional ERP are similar in that instructions are given which invite the patient to fully engage with unpleasant emotions, feelings, and bodily sensations, duration of exposure in clinical settings is conditional to the patient's and therapist's agreement that unpleasantness and anxiety have decreased to a sufficient degree. That is, the exposure condition might have been representative of how an exposure might begin with classic ERP but not necessarily how it would proceed, thus preventing reductions in unpleasantness and strength of obsessions. However, both the acceptance and exposure condition reduced the relationship between OCD symptom severity and immediate

[2] The reviewers suggested using a cut-off score for the OCI–R subscale washing in order to ensure that the stimuli used were disorder-relevant for all participants and excluding one participant due to the use of benzodiazepines. Therefore, we separately re-ran our analyses accordingly. As responses in OCI–R subscales are recorded on a five-point scale ranging from 0 to 4, we excluded patients with a score <2 (n = 12), that is, analyzed a subset of patients (n = 41) with at least moderate-to-high obsessive–compulsive washing symptoms. Results were largely similar to those with the full sample (Table S1 in the supplementary material). The only exception was that the main effect for experimental condition (urge to perform compulsions) was not significant anymore with F(2; 603.59) = 1.96, p = .142. However, when examining Fig. S1, it can be seen that mean ratings were similar to the original analyses and thus, that the p-value is only a result of the smaller sample size and not a reflection of a true effect. Excluding the patient using benzodiazepines did not change interpretation of results (Table S2 and Fig. S2 in the supplementary material). The results of all supplementary analyses can be found at https://osf.io/jq4vt.

Table 2
Coefficients of the four linear mixed models estimating effects of either exposure or acceptance compared to the neutral condition on unpleasantness, acceptance of unpleasant thoughts and feelings, strength of obsessions, and urge to perform compulsions.

A: Linear mixed model for unpleasantness

Fixed effects	*Estimate*	*SE*	*t*	*df*	*p*	*95% CI*
Intercept	5.47	0.44	12.54	17.25	<.001[a]	[4.55, 6.39]
Acceptance - Neutral	−0.50	0.21	−2.43	774.30	.015[a]	[-0.90, −0.10]
Exposure - Neutral	0.70	0.21	3.38	774.17	.001[a]	[0.29, 1.10]
Acceptance - Exposure	−1.20	0.24	−5.03	774.14	<.001[a]	[-1.75, −0.64]
Random effects	*Variance*					
Patient	3.43					
Stimulus	0.89					
Residual	5.90					

B: Linear mixed model for acceptance of unpleasant thoughts and feelings

Fixed effects	*Estimate*	*SE*	*t*	*df*	*p*	*95% CI*
Intercept	5.05	0.31	16.10	40.80	<.001[a]	[4.42, 5.68]
Acceptance - Neutral	0.94	0.20	4.72	773.82	<.001[a]	[0.55, 1.33]
Exposure - Neutral	0.20	0.20	1.00	773.67	0.319	[-0.19, 0.59]
Acceptance - Exposure	0.74	0.23	3.23	774.23	<.001[a]	[0.20, 1.28]
Random effects	*Variance*					
Patient	3.13					
Stimulus	0.21					
Residual	5.49					

C: Linear mixed model for strength of obsessions

Fixed effects	*Estimate*	*SE*	*t*	*df*	*p*	*95% CI*
Intercept	4.27	0.41	10.51	35.19	<.001[a]	[3.45, 5.10]
Acceptance - Neutral	0.03	0.20	0.13	773.14	.898	[-0.36, 0.41]
Exposure - Neutral	0.85	0.20	4.35	773.13	<.001[a]	[0.47, 1.24]
Acceptance - Exposure	−0.83	0.23	−3.65	773.16	<.001[a]	[-1.36, −0.30]
Random effects	*Variance*					
Patient	5.04					
Stimulus	0.46					
Residual	5.35					

D: Linear mixed model for urge to perform compulsions

Fixed effects	*Estimate*	*SE*	*t*	*df*	*p*	*95% CI*
Intercept	4.26	0.41	10.28	50.69	<.001[a]	[3.43, 5.09]
Acceptance - Neutral	−0.26	0.19	−1.36	774.17	.175	[-0.64, 0.12]
Exposure - Neutral	0.30	0.19	1.57	774.08	.117	[-0.08, 0.68]
Acceptance - Exposure	−0.56	0.22	−2.53	774.14	.012[a]	[-1.08, −0.04]
Random effects	*Variance*					
Patient	6.50					
Stimulus	0.29					
Residual	5.11					

Notes. All models were fitted using restricted maximum likelihood estimation. Random effects are intercepts for patient and stimulus clustering. Degrees of freedom were approximated using Satterthwaite estimation. Reported *p*-values are unadjusted *p*-values.
[a] Statistically significant difference after Bonferroni–Holm corrections for multiple testing.

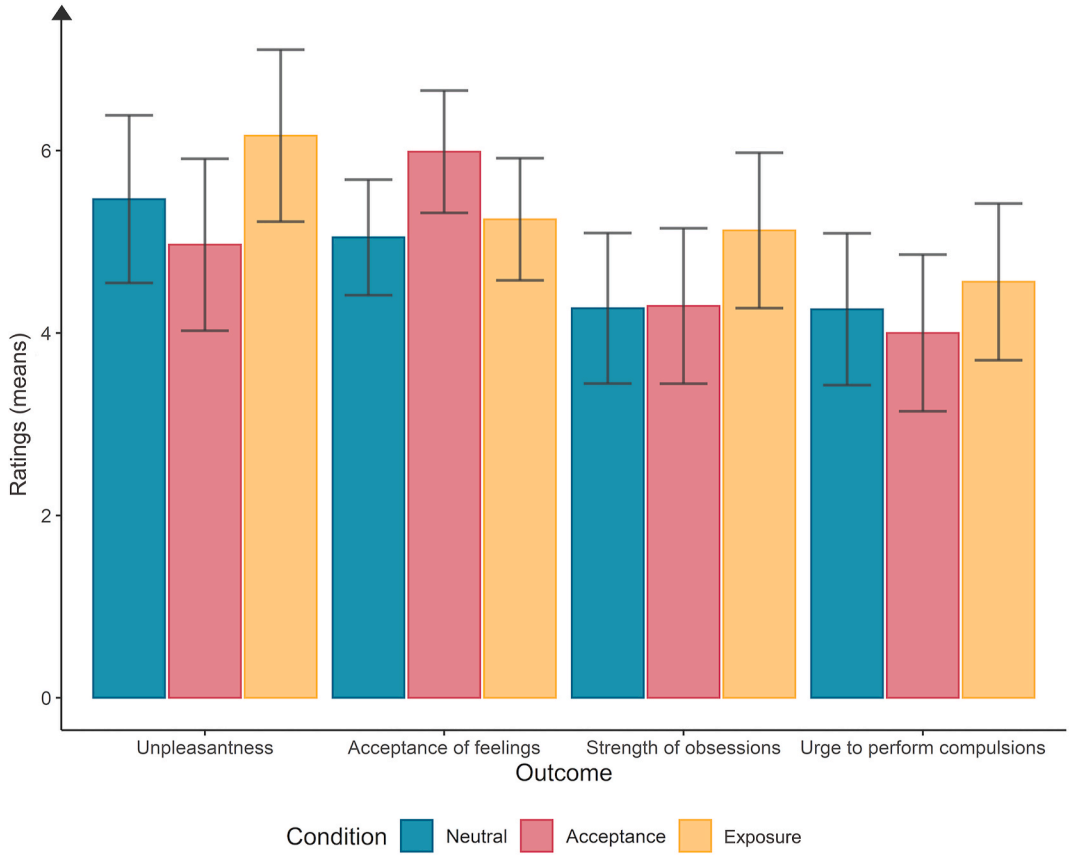

Fig. 1. Estimated marginal means of the four outcome measures as a function of experimental conditions. Error bars represent 95% confidence intervals.

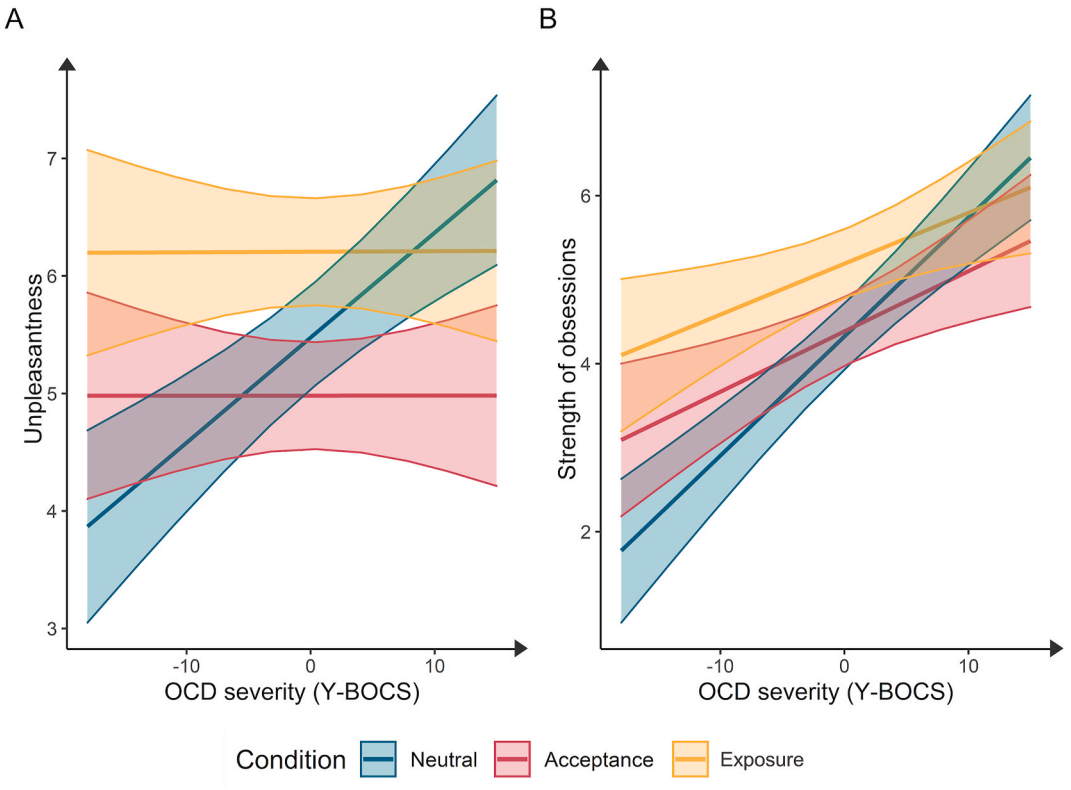

Fig. 2. Simple slopes with standard errors for probing the moderation effect of experimental conditions on the relationships between obsessive–compulsive disorder (OCD) symptom severity (grand mean-centered Yale–Brown Obsessive Compulsive Scale [Y–BOCS] total scores) and (A) unpleasantness and (B) strength of obsessions. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

unpleasantness/strength of obsessions, suggesting that both conditions still had somewhat therapeutic effects.

As in every study, interpretation of the current findings is limited to the participants and methods investigated. Thus, the current results are limited to inpatients with OCD and may not translate to other persons with OCD, for example, outpatients who usually have a lower OCD symptom severity than inpatients. In addition, selection of stimuli can be considered a limitation as stimuli relevant to obsessive–compulsive washing were used and, therefore, results may not translate to other stimuli and other forms of obsessions and compulsions. Future studies may, therefore, benefit from including idiosyncratic stimuli in the experimental design as a study by Baioui et al. (2013) showed that the response of patients with obsessive–compulsive washing partly depends on the individual fit of disorder-relevant stimuli. Another option to increase the intensity of the experience in future experimental studies for patients and create an even more realistic setting may be the use of virtual reality technology. Finally, OCD symptoms were assessed with self-report measures which may potentially be susceptible to biases such as demand effects. Thus, future studies may additionally include therapist ratings.

Other issues which need to be considered pertain to the design of the task. We did not use a condition showing neutral, that is, non-disorder relevant stimuli. Future studies should, therefore, incorporate a condition with neutral stimuli in order to have a truly neutral baseline reference. Furthermore, as conditions and picture presentation were not randomized, we cannot exclude habituation effects due to the passive viewing condition, which might have attenuated the effects in subsequent trials. In addition to that, the time limit of 90 s used in the exposure condition might have only mimicked the early phase of ERP. Hence, the exposure condition in the current study was representative of how an exposure with classic ERP begins but not necessarily to how it would proceed. Moreover, besides acceptance, there are several other mechanisms relevant in ERP and ACT such as cognitive defusion or values (Twohig, 2009; Twohig et al., 2015). Yet, the experimental nature of the current study required focusing on one of those mechanisms and examine it in more detail. Nevertheless, future studies should also investigate other mechanisms of ACT and ERP in order to gain a comprehensive understanding of ACT and ERP. Finally, while we investigated immediate effects after cue exposure, it cannot be inferred how long these effects last or whether there may be delayed effects that cannot be observed directly after cue exposure (Ong et al., 2022).

In conclusion, results indicate that using acceptance-based strategies during cue exposure contributes to immediate reductions in unpleasantness and higher acceptance of thoughts and feelings in inpatients with OCD. Yet, it appears that these acceptance-based strategies do not change obsessive–compulsive symptoms immediately. Future studies may, therefore, examine if effects on obsessions and compulsions may be more delayed or require repeated exposure sessions.

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CRediT authorship contribution statement

David R. Kolar: Methodology, Software, Formal analysis, Writing – original draft, Writing – review & editing. **Adrian Meule:** Methodology, Data curation, Writing – original draft, Writing – review & editing. **Eva M. Zisler:** Writing – original draft, Writing – review & editing. **Caroline Schwartz:** Conceptualization, Funding acquisition. **Ulrich Voderholzer:** Conceptualization, Supervision, Writing – review & editing.

Declaration of competing interest

All authors declare that none of them has a conflict of interest.

Data availability

The data are available at https://osf.io/whmcy.

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Appendix A. Supplementary data

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